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THE

CLIMATE OF LONDON,

DEDUCED FROM

Meteorological Observations,

MADE AT DIFFERENT PLACES

IN THE

NEIGHBOURHOOD OF THE METROPOLIS.

BY LUKE HOWARD.

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IN TWO VOLUMES.

VOL. I.

Containing an Introduction relative to the Construction and Uses of several Meteorological Instruments; Tables of Observations for Ten Years, with Notes and Results; Accounts of collateral Phenomena in other Parts of the World; and occasional Dissertations.

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INTRODUCTION.

General Observations.

METEOROLOGY, though greatly advanced of late years, especially in what regards the perfection of its instruments, and the art of observing the changes of the atmosphere, is yet far from having acquired the regular and consistent form of a science. Its facts lie for the most part scattered, or rather buried, in volumes chiefly taken up with other more cultivated branches of natural philosophy: and it is only where detached publications have been ventured on, by individuals engaged in the study of particular classes of phenomena, that its principles have been developed with the clearness and method of which they are susceptible. A pretty large number of observers have been long engaged in doing for this science the office which the Chaldean shepherds are thought to have performed for astronomy. We may now probably venture, with safety, to anticipate some of those conclusions which posterity will otherwise have to draw from our data—to lay the ground-work of the edifice, if not to proceed to build, with the present materials. Should it be inquired, for what end—the answer (without travelling to more remote consequences) may be—For the benefit of *agriculture* and *navigation:* two objects of that magnitude that the most distant prospect of the smallest permanent addition to our store of knowledge and experience concerning them, will be slighted by none but those, who have not duly considered the influence of science on the arts, and of these on the well-being of society.

An extensive co-operation of observers in different countries has been justly deemed essential to the perfection of meteorological research.* But if we except the single instance of the Society of *Manheim*, patronized by the Elector Palatine, the voluminous Transactions of which, compiled from an extensive correspondence, include the years from 1781 to 1785, there seems to have been nothing done on a great scale to attain this object.

In the mean time observations continue to be made and published throughout Europe: and it is probable that many individuals have acquired, at least, a knowledge of the peculiar features of their own climate, and of the facts which, properly arranged, would form its *history*. The production of such a work for each of those districts, in which the requisite observations have been made, would greatly abridge the labour, if it did not remove the principal difficulty, of a general view of the phenomena of our atmosphere, in their various localities and relations through the year: which being obtained, we might proceed to constitute, on sound principles, the theory of the science.†

The volume, which on such considerations is now offered to the public, is composed chiefly of the observations of *ten years*, from 1807 to 1816 inclusive, made in the neighbourhood of *London*. They have appeared, for the most part, as monthly reports in different scientific Journals; but of necessity in an insulated form, and without the connexion and the illustrations which it has now been my endeavour to bestow upon them. They are intended to form (in a *Second Volume*) the basis of such a methodical account as I have hinted at, of the climate of *London*: or rather of that district in which the Metropolis with its suburban branches, have during the last ten years, been rapidly extending.

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* Kirwan on the Variations of the Atmosphere, Dublin, 1801.

† In the spring of last year, I attempted to give a coup d'œil of the facts and principles of this interesting department of knowledge, in the way of lectures to a circle of friends. The best sketch which I was able to get ready for the occasion, aided by the globe, some graphic representations, and a few experiments with instruments, proved so far satisfactory, that I have been induced to give expectations of enlarging and publishing it. But I cannot promise, as my friend William Phillips (whose "Lectures on Astronomy" instructed and gratified the same audience) has ventured to do for me, that this shall be done "at no distant period."

Of the Calendar and Arrangement.

In introducing to the reader's notice this collection of observations, I ought in the first place to account for the peculiarities of the arrangement. I had given them, from the first, to the press, not as usual in calendar months, but in periods of a lunar revolution. In so doing I had two objects in view.

In the first place I obtained an earlier insertion in the periodical publications (which come out on the first of each month) than would have been possible, had I carried them up to the close of the preceding month: the difference, as the reader will perceive, is on an average two weeks in my favour, though at the expense to the publisher of inserting one table more in the course of two years. Secondly, and what more induced me, my attention had been for some years called to the question, so much agitated among meteorologists, whether, and in what way, the relative positions of the moon in the different parts of her complex orbit, influence the state of our atmosphere. I thought the most convenient way of investigating this subject, and which might bring out, even unexpectedly, facts capable of deciding the question, would be to digest my results in lunar periods at once. I lost by this means the facility of having them compared monthly with those of other observers: and I obtained in return, sufficient materials for deciding in the affirmative the first part of the question above-mentioned, as well as for throwing, possibly, some light on the second; which, however, is one of too great difficulty to be treated with much success, except by *combined* and *extensive* observations.

Having adopted, at the commencement, a period beginning at the *new moon*, the first three years will be found thus arranged. From the close of the year 1809, however, I preferred the *last quarter;* as by setting out from this, the phases of new and full moon appear in the midst of their respective moieties of the observations.

One other circumstance I may here notice. I have prefixed to the calendar names of the months their numerical designations, and where I write myself, I use these in preference. This is the phraseology of the Society of Friends to which I belong, and is from principle, as well as education, a part of my form of Christianity. The reader who may not approve of this peculiarity, will therefore be pleased to tolerate it: which he will do the more willingly, on finding that it interferes but little with his convenience in reference.

The following is the method I use in noting my observations. About *nine* in the morning, I make the round of the instruments (the *situation* of each of these will be noticed, in treating of it in its place); I find it the securest way to do this with the slate and pencil in hand. The direction of the wind, for the past twenty-four hours, usually from memory, but with due reference to the present posture of the vane, is noted for the *first* column.

The actual place of the quicksilver in the *barometer*, with the place it has moved from, as indicated by the hand index, are put down for the second and third columns; and for the fourth and fifth the situation of the two indexes of the *thermometer*, which are then adjusted with the magnet. The amount of *rain* is ascertained and noted for the seventh column. The actual place of the index of De Luc's *hygrometer* occupies the sixth column—*but always a day in advance* of the other observations: all of which, *as relating to the past twenty-four hours*, come under the date of the day *preceding* that on which they are thus noted. In other words, the day I use extends from nine in the morning to nine the next morning. The *daily evaporation* occupied the sixth column before I began to make use of the hygrometer. After inserting these in their places in a book, previously ruled, and the ruled page dated throughout, I add on the opposite page miscellaneous notes, from memory as to past, and from observation as to present phenomena.

Of the Wind and Vane.

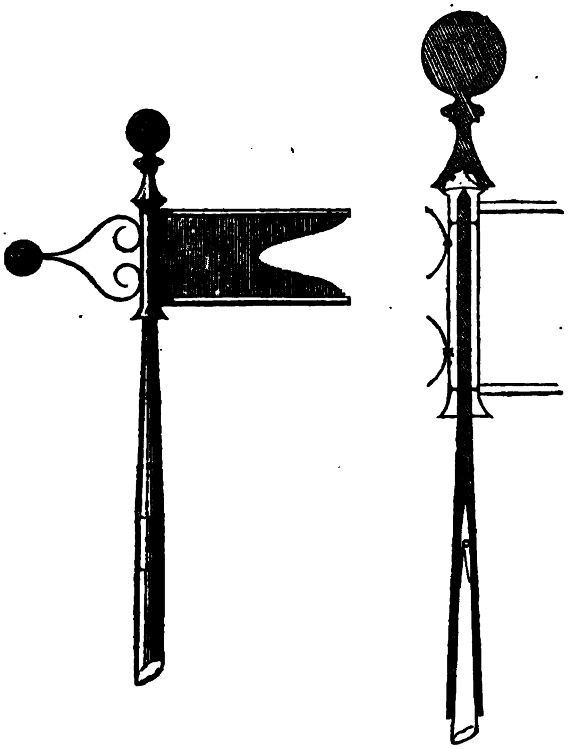
In noting the winds, I have used only eight points of the compass: the observations are therefore in general but approximations to truth. I have endeavoured to give the *prevailing wind* for the day; neglecting this consideration at times, to show the order of succession, or an account of a remarkable degree of force.

If we reflect on the height of even the denser part of the atmosphere, and the great proportion of night to day in our winter months, when the winds are busiest, we shall be forced to admit that our knowledge of the currents in the variable climate of these islands is very imperfect. Like fishes inhabiting the bottom of an ocean, we are insensible to much of what passes over our heads.

The *vane*, however, is not the limit of our means. We know that certain winds always set in above, before they are felt below; and it is when they come so low, that we can detect their direction (in the day-time at least) that they have the most influence on the character of the season. These subsiding currents may often be traced by bringing some elevated streak or spot of cloud, which may appear at first motionless, into visual conjunction for a short time with a fixed object, such as a tree-top, or the parapet of a house. Balloons are more effectual, as they show every current they pass through: but they are too troublesome for frequent use. The low currents, which glide up and down the valleys in a calm evening, are often amusingly marked out by the *smoke;* which they will carry to a small distance, and then return it at an acute angle in the opposite direction. And this means of detecting light winds is at no time to be neglected.

For the strength or violence of the wind, I have employed only the terms in general acceptation. An arbitrary *estimate* of the force by marks or numbers, I consider as conveying nothing more definite than the usual phrases; and I have never possessed an instrument for measuring the degree of force that satisfied me in use. Nor would the daily use of an instrument, if constructed on more certain principles, be convenient; except in prosecuting specially an inquiry into this subject. Perhaps some ingenious artist may one day overcome the difficulty for us, by making an anemometer, which shall register its own indications for the 24 hours. There is a good design for one, to show the wind and its force *at the time of inspection,* by Kirwan, which may be seen in the Philosophical Magazine, vol. xxxiv. p. 247, et seq. It is extracted from the Transactions of the Royal Irish Academy for 1808, and exhibits a good basis for the above-mentioned project.

I have always employed a very moveable and sufficiently elevated vane. As this instrument is often clumsily made and fixed, I shall take this opportunity to lay down some principles, by attending to which, a workman may be enabled to set up a good one.



1. As to *form:* it should be simple, to ensure durability; and such as that the *resisting surface* may be as nearly as possible confined *to one side of the spindle.* It is curious to observe this principle so commonly violated on our public edifices. Either some inelegant caprice takes possession of the architect or artificer, or it is taken for granted that a new vane must be unlike any old one in existence. The shortest way to convince the workman on this point will be, to propose to him to solve the probable effect of making a vane *alike on both sides:* as he

will soon see that such a vane would be continually taken on its broadside by the wind; consequently, that every approach towards this equality of resistance must both diminish steadiness, and increase the strain on the spindle.

2. As to *suspension:* a spindle of hard iron, tapering to a point not smaller than a writing crayon, should enter into a tube stopped by a harder substance. A *flint,* having a smooth concave face on one side, will answer for this, and it may be fixed in a socket as much larger than the tube itself as is necessary, and so joined to the tube. The spindle is likewise to pass through guides inserted in the tube, and to be sufficiently long, to allow for the subsidence by wear at top. On it, the moving part should rest in equilibrium: the counterpoise is best made by a loaded ball, carried out to the proper distance (which may be found by trial before fixing it) on a slender, single or double branch of iron. The whole is to be kept down on the spindle by means of a second, and larger, moderately loaded ball, mounted on the centre of the vane, and turning with it.

There are vanes to be had ready made in London, which fulfil pretty nearly these conditions, that of great durability excepted. This is best insured, where expense is not an object, by using copper well gilt for the material.

3. As to *position:* it is obvious that this instrument ought to be clear of deflections and eddies, from objects on the same or a higher level.* That it may the more easily be so placed, the spindle may end in a taper shaft,

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* The site of Geneva remarkably exemplifies the effect of local position in this respect. Here, owing to the direction of the valley, the vanes point almost constantly either to SW or NE; the cross winds going over above their level.

capable of receiving a fir pole: the latter should be well painted before fixing, and the vane put on and adjusted after it is fixed.

In this stage of the business the workman will require a compass, if letters are as usual attached to the vane; and he must observe, that when the needle, by moving the compass round, is made to point to the *variation* north (at present 24° west of north), the north on the card of the compass will be the point for the north of the vane. The exact variation is now annually inserted in the Philosophical Transactions, and other publications.

The vane in the figure is on the scale of an inch to a foot: the section, in which the spindle, the flint, and the guides are represented, is drawn two inches to the foot: the spindle and tube are stout enough for a much larger vane: the branches carrying the ball are seen edgewise.

Of the Barometer.

On the construction and uses of this instrument much has been written which need not here be repeated. In applying it to the purpose of the meteorologist, it is the due attention of the observer to the changes it undergoes, rather than the perfection of the instrument itself, that serves to promote science. Yet as the mean of a given number of observations at any place is applicable to other not unimportant ends; and as these means must for the most part differ by but small quantities, it is desirable that every barometer, from which we are about to take the pains to register a series of changes, should have the previous labour bestowed upon it of adjustment to a fixed standard, which is probably done in but few instances at present. As to corrections for the slight variations of temperature which take place in an inhabited apartment, I have not thought it needful to enter upon them. These niceties appear to belong to a more advanced state of the science; and there are other sources of discordance, at present more obvious, in the generally varying and imperfect construction of the instrument.

I have employed the same barometer in all my observations at home: but in consequence of slight accidents, it has been more than once re-filled, in doing which I have endeavoured to restore, as nearly as possible, the former adjustment: the amount of the error of this will therefore be discoverable at any time. It is on the wheel or siphon construction, made by *Haas* about the year 1796. The scale extends through a space of 18 inches, and the workmanship is delicate; the weight which rests on the quicksilver preponderating by but a few grains, so that the *radius*, or hand, makes a sensible libration on suddenly opening or shutting the door of the room, as well as during the passage of the strong gusts in a storm of wind. I find an advantage in having it fixed in a place by which, when at home, I pass frequently in the course of the day: for as often as I perceive, by the divergence of the radius from an *index*, which is also made to traverse the circle, that there has been a movement, I adjust the latter to the place, and thus secure the extremes. At the hour of observation, if the movement has been wholly in ascent or descent, the extremes are found, the one in the highest or lowest point of yesterday, the other in the present place of the radius: but if there has been a change of *direction* to any extent worth notice, the index (which is never put back again in this case, but left in the place) points out one of the extremes to be noted, and the radius the other. It is rare that such changes happen in the night, or more than once in the twenty-four hours. To obtain a true *mean* for this period, it would be needful to put down a considerable number of observations. In re-printing my tables, I have given the extremes only; purposing hereafter to make use, in another way, of the *medium* heights, which were printed for several years in a third column: and the same, as to the medium heights of the thermometer.

I have possessed for some years an eight-day astronomical clock, having a barometer connected with it, made in 1766, by *Alexander Cumming*, and which, on the decease of that excellent mechanic, his family allowed me to purchase by a valuation. This curious instrument records, by means of a pencil supported on the quicksilver, and traversing a revolving scale, the movements of the barometer throughout the year; requiring for this purpose little more attention than the regular winding up of the clock. When I bought it, there was a latent defect in the bearings of the escapement, which for a long time gave me considerable trouble, the false beat which it occasioned coming on at uncertain intervals, during which the going was incorrect. This I have at length discovered and remedied; as I can now put full confidence in the reports of this *automaton*, I shall probably give them to the public at intervals, with remarks. In the mean time I may observe, that the advantage it confers on a diligent observer, with respect to the *extremes* of movement, is less than might have been expected.

These may be got nearly as well, with daily attention, in the way I have mentioned, from a good barometer alone: but in the case of absence from home, in that of great depressions, which may have their crisis in the night, and for studying the succession and character of the different movements, it is a most valuable assistant.

In the autumn of 1801, being desirous of exhibiting on a very large scale the variable pressure of the atmosphere, I determined on filling a barometer with *linseed oil*, which is known to remain fluid in the greatest cold that obtains in our winters. The tube was an inverted siphon of lead pipe, fixed against an outer wall of my house; the short leg of the siphon, in which the movement was to be obtained, rising into the basement story. I had the two extremities made of tinned copper, each an inch in diameter. The proportions of the instrument were deduced from a comparison of the respective specific gravities of the oil and of quicksilver. I calculated the range of the column at about three feet six inches; one half of which being lost by the siphon construction, the remainder might still have been extended by a float and pulley, with a proper radius, to a scale of several yards. I managed by means of the air-pump, and by repeatedly exposing it to the Torricellian void in the tube itself, to clear the oil of the great quantity of *air* which it contained; and in effect to place it in counterpoise with the atmosphere. On proceeding to observe the movements, by means of a rod supported on the shorter column, I found the range such as I had expected: but the discrepancy of the proportionate variations of the oil and quicksilver barometers was continual and great. The cause of this appeared to lie in the changes of temperature out of doors. These might have been allowed for by calculation: but as it was evident that the lead pipe also must undergo considerable changes of capacity from this cause, the project became too complicated, and I gave it up. I still think that in some situations, such as the shaft of a mine, where the requisite height could be obtained for the column with an equable temperature, that such an instrument might be used, either with linseed oil, or water, to procure a large extent of variation.

Of the Thermometer.

I shall say nothing in this place about the common thermometer, in the use of which the meteorologist only partakes with others. The thermometer of *Six* may be called his exclusive property, and it is the best adapted to his purpose. This most useful instrument was invented about the year 1780, by James Six, of Canterbury:* the following year was probably the first in which the temperature of both day and night was accurately noted; and this observer first discovered that the nocturnal cold is greatest near the surface of the earth. The idea of a thermometer to mark the extremes of temperature appears to have originated with one of the *Bernouillis:* it was worthy of a great genius, and the science will continue to owe much both to the invention which conceived, and to the ingenuity which executed it.

Like some other instruments, however, this has become degraded in the hands of successive workmen: it has now several defects; and as we have no substitute for it of nearly equal merit, I shall bestow some notice on these faults, and point out the most obvious remedies.

1. The *size* of the whole instrument has been injudiciously lessened. Originally, the tube containing the alcohol was "about 16 inches long, and $\frac{5}{16}$ of an inch in diameter." I now meet with them commonly of about half this length: though it is obvious, that the crowding together of the divisions on the scale, which ensues from this change, must increase the chances of error, both in graduating and observing: while in point of sensibility (the usual reason for a small bulb) the instrument can have gained but little.

2. The original construction of the *indexes,* or floats,

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* See Philosophical Transactions, vol. lxxii. lxxiv. lxxviii.

has been abandoned, I know not on what account; but the substitute is, at all events, a bad one. A spring made of no better material than a stiff hair is now imperfectly attached to a needle, which is capped at each end with a drop of glass. But the needle was at first inclosed in a fine tube of glass: this was inserted at each end in a short *cylinder* of glass, nearly of the diameter of the tube in which it was to move; and the spring consisted of a glass thread, drawn out taper from the upper cylinder, to the length of $\frac{3}{4}$ of an inch; which, being set a little oblique, pressed lightly on the side of the tube when introduced. The *length* of this spring, added to that of the needle, was a disadvantage; as the latter was stopped in its ascent, and became useless as an index, at a considerable distance from the probable extremity of the scale. There was likewise no necessity for inclosing the needle in glass. I would propose to make the index of a needle $\frac{3}{4}$ of an inch in length; to restore the *cylindrical caps,* which may be made, as at first, of very short pieces of tube; and to insert along with the needle into the upper cap, three pieces of the finest steel wire. These being cut off just above the lower cylinder, bent a little outward, and severally capped at the point with a very small drop of fusible glass, will form springs, having their play in the space between the two cylinders, round the needle; and they will be as durable as the instrument itself.

I conceive that the resistance of a cylinder, *nearly filling the tube,* will enable the quicksilver to move these springs without danger of passing above the index, as happens sometimes at present with the globular caps. Then as to the *magnet,* I would advise such an one to be sold with the instrument as will at all times command the needle: one which will lift some pounds, and with provision for keeping a weight appended to it, to preserve its power. The sinking of the index, which defeats the whole purpose of the invention, I conceive will thus be effectually prevented. At any rate, stiffer springs and a larger magnet must be resorted to, to regain its reputation.

3. There is yet a third defect. At the first approach of cold weather, a small bubble of air sometimes makes its appearance in the spirit, which, increasing and getting into the tube, at length occupies several degrees of the scale; but without disturbing the results in proportion. I have got rid of this, by first cooling the instrument, so as to bring the air back into the spirit tube, and then making the bubble move to and fro in the spirit before the fire: the pressure caused by the expansion of the included air and vapour, soon drives it back into the spirit; but it is subject to re-appear. The *radical cure* is, to break the point of the upper bulb, and let in the atmospheric air: very little waste of the spirit will ensue in a long time, if the point be fine: if it be too solid, the glass may be detached from the frame, and the point cautiously drawn out before breaking, by heating it at the flame of a spirit lamp, and applying another piece of glass when it is hot enough to adhere. But as this requires a practised hand, the workman should leave the upper bulb with a point fine enough to be easily nipped off, should it be found needful. Spirit may be introduced into this upper bulb at any time, by first warming, and then cooling it with the aperture immersed.

4. The descending scale is often, and indeed generally, graduated further than the lower end of the index is capable of following it. The workman may avoid this, by sparing a few degrees at the ascending extremity of the scale. Here he need not, *for our climate*, ever go beyond 110°—while, at the cold extreme, the index should be capable of showing 10° below *zero*, which will suffice in all cases.

5. A Six's thermometer should be *mounted* (at about five feet from the ground), on a fixed support, not hung up free, as the present construction indicates, and liable to swing and strike with violent gusts of wind. A mahogany frame, or back, may be provided with two projecting brackets, into which the box scale may enter by a pivot at each end. By this means the thermometer may be set facing that part of the general north exposure, where, from the disposition of the surrounding objects, the heat may have the freest *radiation to the open sky;* a point which late discoveries show to be important: and in situations where it is inconvenient to go in front, the scale will admit of being turned towards the observer.

To the above mounting, it will in some situations be proper to add a small shelter above the instrument, which shall suffice to keep off direct showers at least—and, at a suitable distance on the west side, a shade moveable on hinges, to be interposed, in the heat of summer only, between the instrument and the rays of the afternoon sun.

As the *position* of the thermometers which I have used varied in the different stations, it will be most convenient to describe the position, when treating of the mean temperature at each.

Of the Hygrometer.

In determining to substitute for the daily amount of evaporation, in one of my columns, the degrees of moisture indicated by the hygrometer, I had no hesitation in making choice of that of *De Luc.* This instrument is capable of bearing, with little injury, a constant exposure to the air abroad: I have accordingly kept it hung up, near the thermometer, in a small tin frame, the sides and bottom of which are of open work, with a glass in front: so that the whole instrument is visible, and the air freely admitted, while the rain, and the fingers of the curious, are excluded.

My instrument consists, essentially, of a very slender strip of *whalebone*, which, having been cut out of the piece *across the grain*, and reduced by scraping to the requisite thinness, with a length of about 3½ inches, is so mounted in a brass frame, with a counteracting spring of wire, as to move an index round a circular scale of three inches circumference. The shortening of the strip of whalebone by dryness, and the lengthening by moisture, while the spring keeps it extended, respectively carry the index towards the extremes of the scale. The *moist* extreme, which the inventor fixed at 100°, is now and then attained, in winter, in the natural state of the air: but the *dry*, never.

The latter is accordingly fixed by a method, in which the buyer may at any time prove for himself, whether the instrument has had, or retains, its proper adjustment. For this purpose, a few ounces of fresh-burned quicklime are to be put into a dry wide-mouthed stopper bottle, with sufficient room above for the hygrometer to rest upon the lime without soiling the whalebone. The instrument being placed, the stopper is to be put in, and, for greater security, closed round with putty. In 48 hours, or thereabouts, it will be seen whether the index, under these circumstances, will pass to *zero*, which point it ought not at any rate to exceed. The hygrometer is next to be exposed for a few hours, under a close glass to the vapour of water, at a mean temperature, and if convenient, in a mean state of the barometer; but without being immersed in the water. The index, if right at the other extreme, should now go to 100°.

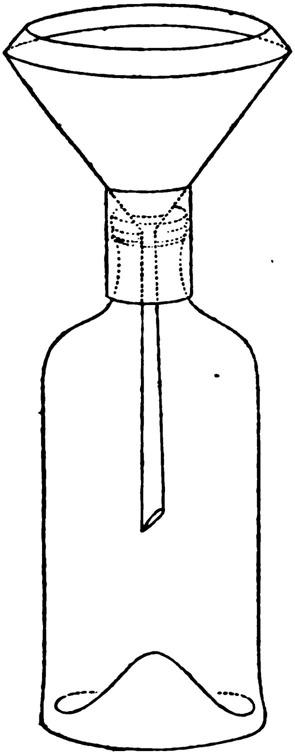
Should it prove out of its place, yet with the proper range, there is at the bottom of the frame a small screw, by turning which it may be adjusted: but should the range prove several degrees too large, or too small, either the parts of the instrument have not been duly proportioned by the maker, or it has suffered by use or accident.

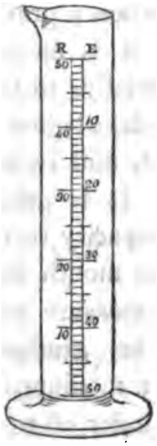
This hygrometer shows the effect of moisture on whalebone to be precisely the same as on a deal board: which, as every one knows, will swell, or extend itself in breadth, in a moist atmosphere, and contract again as it dries. Now the board, after a few summers and winters, loses this property, or becomes *seasoned:* and there is no doubt that the same effect must be produced in time on the whalebone. But the texture of the latter substance is so greatly superior in hardness and firmness to deal, that it is probable few single observers will wear out their instruments. If deterioration, however, be dreaded, it may be indefinitely put off, by exposing the hygrometer only at the time of observation: the few minutes taken up in observing and noting the other instruments, may often, though they will not always, suffice to make it take the degree of moisture present in the air. And for such a mode of observing, the delicate *hair* hygrometer of Saussure, of which I have had as yet but little experience, will be preferred by accurate meteorologists. It is necessary to observe, that though graduated alike, these two instruments do not range together, and their results must not be entered in the same column.

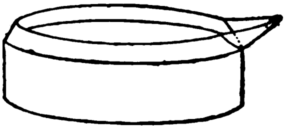
I have caused a workman to add to the hygrometer of De Luc, a pair of detached indexes, to be moved by the one in connexion with the whalebone; in such a manner as to show the greatest degrees of moisture and dryness, which take place in a given interval: but I have not yet had opportunity to prove how far they will answer in practice.

Of the Gauges for Rain and Evaporation.

These are treated of together, as being connected in the most essential part,—the graduated measure for the water.





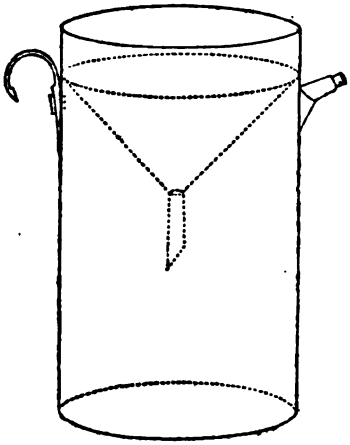


The *rain-gauge* consists of three pieces, a funnel, a bottle, and the measure. The *funnel* is most conveniently made of five inches opening, and of the form represented in the figure: the mouth-piece of brass, turned in a lathe, the remainder of tinned copper. It has two necks: the inner and longer one widening a little downwards, enters deep into the bottle, and conveys the rain: the outer neck is soldered on the cone of the funnel, having no opening into the latter: it serves the necessary purpose of preventing the entrance of water from the outside; and by resting on the shoulder of the bottle, it gives steadiness to the funnel.

As to the *bottle*, a common wine-quart will contain from two to two and a half inches of rain on this funnel; but it is better to use a three-pint bottle (technically termed a *Winchester quart*), which has the proportions given in the figure. For an unusual fall of rain may happen, when a previous quantity has not been measured out: and it is on such occasions that we would wish, more especially, to be certain of the amount.

A cylindrical glass of the depth of eight inches, exclusive of its foot, and 1$\frac{1}{3}$ inch in diameter, serves to make the *measure*. It is graduated into parts, each of which is equal in capacity to the depth of $\frac{1}{100}$ of an inch on the area of the mouth of the funnel. A glass of the above size will measure out fifty such parts, or half an inch at once. The graduation is conducted on the principle (which is a medium between calculation and experiment) that a cylinder of water at a mean temperature, an inch deep, and five inches in diameter, weighs 10 ounces *troy*. The hundredth part of this, or 48 grains, is accordingly taken for the graduating quantity, and the scale is formed by successive additions, at each of which the surface is marked. Considering the nature of this operation, which scarcely admits of our going to fractions of a grain, I suppose the above standard to be sufficiently correct. I have been accustomed to *etch* the scale on the glass with fluoric acid, but it is more conspicuous when engraved at the glass-cutter's wheel. Previously to sending it for this purpose, the whole scale should be traced, either on a strip of paper pasted on before it is divided, or in oil paint on the glass itself. A diamond, or steel point, may be used for engraving the scale, in default of other means.

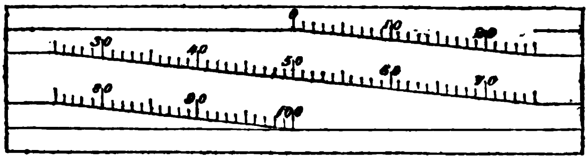
Although I recommend these dimensions as convenient, and have had them executed in different instances for others, I have hitherto used a gauge, the funnel of which has eight inches aperture, and the measure is graduated by the quantity of 124 grains, the bottle being large in proportion.



For tropical climates, and in cases where a large bottle is found inconvenient, the whole recipient part may be of tinned copper, the *rim* excepted, which is still to be of turned brass. On this construction, a moveable funnel may be let in, so as to rest below the rim and prevent evaporation; a spout, with a small aperture, should also be provided at the side, both for the convenience of emptying the water into the measure, and to permit the air, on occasion, to pass out freely. (See the figure above.)

The *position* which, since the year 1811, I have preferred for the rain-gauge, is to sink it into the ground, bringing the mouth of the funnel nearly to the level of the turf; which should be kept cut, so as to leave a clear space of an inch or two around. In winter, when snow may be expected, it is proper to raise it a few inches. A thick sheet of snow is apt to have a large depression above the funnel, the surface of which, slightly thawed and frozen again, has, more than once, collected and sent into my gauge a redundancy of water. On the subject of different products from different situations of the gauge, the reader may consult the appendix to Table lxiv. in this volume.

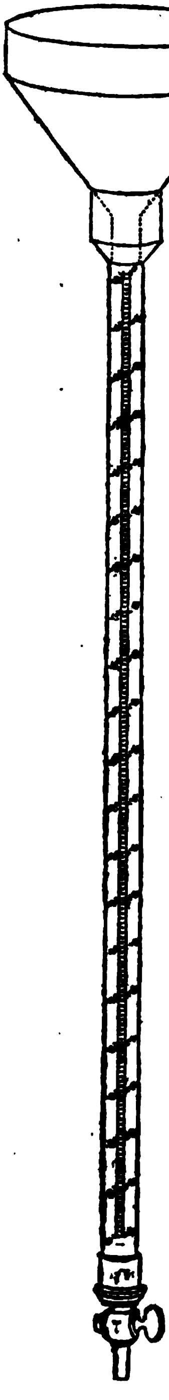
The graduated measure for the rain, being numbered on the opposite side of the scale downward, serves also to ascertain the *evaporation.* For this purpose, a cylindrical tinned copper vessel is employed, of five inches diameter within, furnished with a rim to prevent spilling, in which is a lip, set on clear of the cylinder. Two measures, or an inch of water being poured in, fills two thirds of the cylinder: the vessel is then placed near the ground, in a situation where it may be sheltered from rain, and have the sun's rays without reflection. At the end of 24 hours, or a longer period, extending to a week if desirable, but regulated by the season of the year, the water being returned into the measure, the quantity which has evaporated may be read off, and the vessel replenished. For warmer climates, or longer periods of observation, the depth of the vessel may be increased, and a greater number of measures put in. See fig. p. xxi.



Where the *evaporation* alone is in question, and the observer wishes to ascertain it daily, without trouble, the following contrivance may be used.—On a plate of glass, 6 inches long, and an inch and a half wide, a line is to be drawn, near and parallel to one side, to serve for a base. From this a diagonal scale, etched with fluoric acid, is to be carried up, ascending at the rate of *one* inch in *ten;* so that the tenths of an inch into which it is ultimately divided, shall rise in progression just $\frac{1}{100}$ of an inch above each other. The glass being now fixed perpendicularly on its edge, in a vessel of the proper capacity and depth (if this be *square* it may be set in diagonally, and supported by the angles) a little water is first to be put in; the surface of which is to be brought, by adjusting the position of the vessel, to range with the horizontal line at the bottom of the scale. This adjustment made, more water is to be added, up to the line which cuts the division at *zero*. Then, in proportion as the surface is lowered by evaporation, it will cut the several divisions in succession, indicating at sight the effect to the 100th of an inch.

Lastly, for delicate occasional observations on *rain*, *dew*, or *evaporation*, I have an instrument which will indicate either to the 1000th of an inch, and which I likewise find useful in graduating other gauges. This instrument, a figure of which is given on the succeeding page, I shall now describe.

A funnel like that of the rain-gauge, but with an upright cylindrical rim, five inches in diameter, terminates in a glass tube 20 inches long, and of half an inch calibre; having at bottom a good stop-cock. The tube is graduated on the principle of the glass measure above described: but the divisions are here wide enough to admit of decimal subdivisions. When the instrument is used *for evaporation*, the tube is first to be filled to the *zero at top*; a bottle of water is then to be added, so that the surface may stand at a proper height in the cylinder during the experiment; at the close of which, the same quantity of water being returned into the bottle, the deficiency will appear in the tube. When for *dew*, or for *rain*, in minute quantities, or at short intervals, water is to be introduced up to the *zero at bottom*, and the inside of the funnel moistened with a sponge at the outset; the difference in volume caused by change of temperature, must in these delicate experiments be obviated, or allowed for. This instrument requires likewise a support to keep it upright and steady in use.

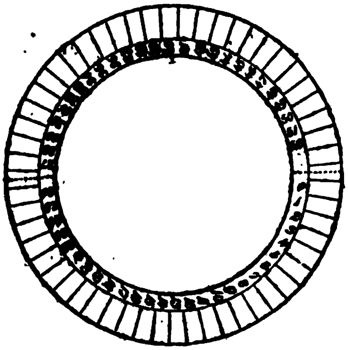


Of the Vapour-point.

As I have two or three times in the course of my observations made mention of the *vapour-point,* I may here explain, that by this term is meant the degree of Fahrenheit's thermometer, at which a body colder than the air (such as a glass of pump water) will no longer collect moisture from it. For this experiment (which was first introduced by Dalton, and is a useful one in studying the subject of *rain,* though seldom performed) the liquid in the glass should be cold enough, either naturally, or by artificial refrigeration, to ensure the effect above-mentioned: then, as the temperature of the glass slowly increases by the contact of the moist air, it is to be repeatedly dried with a clean cloth, till the dew no longer re-appears on its surface; at which moment a delicate thermometer, previously immersed in the liquid within, gives the vapour-point, or the lowest temperature at which vapour can subsist in the present state of the atmosphere. See the notes to table i. lxvii. lxxxiii.

Of the Cyanometer.

One of these instruments having been put into my hands by Professor Pictet, at Geneva, in the summer of 1816, I brought it home to make trial of its use: but the almost continual recurrence of turbid skies since that period, has nearly defeated my purpose hitherto. I shall, however, describe and figure it for the reader's information. The figure on the succeeding page is drawn one fourth of the actual dimensions. I have not attempted to express more than the general outline.



The cyanometer of Saussure is, in effect, a circle of small pieces of paper tinted with blue, and pasted on a card, which is open in the middle, and folds in two, with the patterns inward. They are numbered from 0 to 52: the last is of the colour of solid indigo, that is, nearly black; and the colours lighten gradually through the whole series, till, at 0, nothing remains but the white paper. The colour goes quite to the outer edge; but on the inner, a space is left for the number.

Its use is, to assist the judgment in determining the degree of intensity of the blue colour of the sky; which varies greatly in different seasons, and still more in different climates, and at different elevations in the atmosphere. For this purpose it is held up in such a direction that, while a full light falls on the pattern, the sky may be seen at the same time; and the card is turned till the sameness, or near approximation, of the tint of some number is decided on; which is then set down for the colour of the sky.

This invention is chiefly useful to the traveller, who, in ascending mountains, and in changing climates, meets with a range of colour to which a single situation scarcely affords a parallel. About half the range of the scale may be found, probably, in our own skies. That they do not attain to the intensity of those on the more elevated parts of the Continent, is manifest from the surprise with which our travellers view for the first time the blue rivers and lakes of those countries. They forget that they are in fact contemplating, in a natural cyanometer, a phenomenon to which, by its gradual approach, the eye had already become accustomed, when turned to the vault of the heavens.

Simple as this little instrument appears, I have great doubt whether our workmen, who may attempt it, can give it any improvement; save, perhaps, by securing the back with morocco leather, and providing a case. The form and size were certainly adopted after mature reflection, and different trials. Those who incline to exercise their ingenuity on this subject, may do it with more promise, by trying different combinations or thicknesses of *blue glass*, to be viewed against a ground of dead white, in the manner above-mentioned.

Of the Electrical Apparatus.

There are several ways in which the electricity of the atmosphere may be investigated, as

1. By *small instruments* managed by the hand, with some of which the most minute quantities of it may be detected. Of these I have had very little experience, and shall therefore omit to treat of them.

2. By the *insulated rod*, or conductor. In the first three years of my observations, the reader will find pretty frequent notice of the state of the natural electricity, obtained in this way. My apparatus was constructed on the plan of that described in the Philo. Trans. vol. lxxxii. part ii. by John Read, who, in the years 1790 and 1791, accumulated a valuable mass of facts on this subject, which he has there reported. I made, however, the following variations in the apparatus: the *conductor*

itself was a single taper rod of iron, which by a screw at the bottom entered firmly into a brass cap, cemented upon a glass pillar; the latter standing *free* in a socket of wood. By means of a stout glass tube, and other defences of glass and cork, the rod passed up through an angle of my observatory, rising seven or eight feet above the roof, which height I found sufficient. I added to the part which communicated with the ground, a stout *arm*, which, turning on a joint, could at any time be shut to the cap of the pillar, so as to make the whole a conductor to the earth: and in this state I commonly left it, when out of use. When I removed my residence, I took down this apparatus, and have not erected it at Tottenham. Hence the deficiency of electrical observations in the latter years.

3. By the *insulated kite*. This subject is well handled by Cavallo, in the second volume of his Treatise on Electricity. The few experiments I have made with the kite amply confirm to me his opinion, that the metallic thread is the *conductor* in this case, and the kite its support only. I have likewise discovered what seems a material improvement. Instead of twisting together the conducting and supporting threads, as heretofore, I leave the kite with its string precisely in the state in which boys raise it: so that it may be flown in a pretty high wind, and carry out plenty of line of sufficient strength; or in gentle gales, a lighter string. The conducting thread, which may now consist of the fine lace-thread before intertwisted with the common string, is tied to a loop in the latter, two or three yards below the kite: so that while the kite is set up by two persons, a third lets out the lace from an insulated reel; keeping always to leeward, that the *stress* may be wholly on the common string. When this is let out to the desired length, it is likewise insulated, by attaching a loop tied in it to a hook fixed on a glass handle. By this management, the con-

ducting thread hangs as nearly perpendicular as the wind may permit, and is in little danger of breaking.

Those who attempt to use this apparatus should have skill enough to know when the clouds actually portend a discharge to the earth: at which times alone I believe it to be attended with any danger. It is the most likely method I know of, to obtain satisfactory observations on the electricity given to the air by the passage of *clouds*. That of rain, hail, or snow, is certainly best collected by the insulated rod.

4. The variable electricity of the atmosphere has been found to affect considerably the action of *De Luc's electrical column*. As some instances of this kind occur in the observations of my friend Thomas Forster, inserted in this work, I shall follow his description of the instrument. It is composed of a great number of small circular and very thin plates, of silver, of paper, and of zinc, alternately placed on each other, and pressed closely together, so as to form a column. One end of the column thus arranged is observed to become permanently electrified *plus*, the other *minus*: a *bell* is connected with each, and a small ball of metal is suspended between the bells. The whole is enclosed in glass and *insulated*. From the tendency of the electricity to become equalized, while it is continually renewed, the metallic clapper keeps passing to and fro between the bells. And the varieties in the kind of pulsation produced by this means, with its occasional intervals, or even cessations for a considerable time, constitute the effects to be studied in connexion with the other phenomena of the season.

Of the Notes and Miscellaneous Matter.

The notes appended to my earlier tables of observations were published in an incomplete state: the confined interest of the subject at that period, and some uncertainty as to the probable reception of the terms used to designate the clouds, made me sparing of them for two or three years. On concluding to insert the suppressed notes in this work, I found that, from the mode of reference by letters instead of dates, it would be no easy task to incorporate them with the rest. They are therefore left in the less convenient form of *additions*.

The *nomenclature of clouds*, to which I have just alluded, having now grown into pretty general use among the meteorologists of our own country, I shall not need to introduce it to the reader as a novelty. In the second volume the terms for the clouds, which are used in the notes, will be fully explained. In the mean time the reader, who may not have acquired them, will find the system in its original state in Tilloch's Philosophical Magazine, vol. xvi. xvii. and (with some changes not affecting the nomenclature) in Rees's Cyclopædia, article *Cloud;* as also in Nicholson's Philosophical Journal, vol. xxx. It has been abridged and reported in several other publications: and, in the supplement now publishing to the Encyclopædia Britannica, with the addition of a set of new terms for the modifications, intended for the use of English readers. I mention these in order to have the opportunity of saying that I do not adopt them. The names for the clouds which I deduced from the Latin are but seven in number, and very easy to remember: they were intended as *arbitrary terms* for the *structure* of clouds, and the meaning of each was carefully fixed by a definition: the observer having once made himself master of this, was able to apply the term with correctness, after a little experience, to the subject under all its varieties of form, colour, or position. The new names, if meant for another set of arbitrary terms, are superfluous: if intended to convey in themselves an explanation in English, they fail in this, by applying only to some part or circumstance of the definition; the *whole* of which must be kept in view to study the subject with success. To take for an example the first of the modifications—the term *Cirrus* very readily takes an abstract meaning, equally applicable to the rectilinear as to the flexuous forms of the subject. But the name of *Curl-cloud* will not, without some violence to it's *obvious* sense, acquire this more extensive one; and will, therefore, be apt to mislead the learner, rather than forward his progress. Others of these names are as devoid of a meaning obvious to the English learner as the Latin terms themselves.

But the principal objection to English, or any other local terms, remains to be stated. They take away from the nomenclature its present advantage of constituting, as far as it goes, an universal language, by means of which the intelligent of every country may convey to each other their ideas without the necessity of translation. And the more this facility of communication can be increased, by our adopting by consent uniform modes, terms, and measures for our observations, the sooner we shall arrive at a knowledge of the phenomena of the atmosphere in all parts of the globe, and carry the science to some degree of perfection. What would geography have been at this moment, had such descriptions of boundaries as those we meet with in the book of Numbers, or in Joshua, never given place to the universal language of maps and globes?

The *miscellaneous extracts* might have been made more copious than they will be found on the whole, but I avoided taking them from sources where they were already easily accessible to the reader. They are inserted for different purposes: some, to explain the cause of appearances recorded in the notes, as in the case of distant thunder storms: others as being supposed to have a more remote connexion with my own observations: lastly, not a few to serve as examples of meteorological and physical phenomena, to which I might have occasion to advert hereafter. The portion which I derived from the public papers was selected from materials obtained in the following manner:—In the daily paper taken for use at our laboratory, a line is drawn by my desire, in the margin of all such passages as have any relation to the weather, or to physical phenomena. Thus, though absent, I secure them for future notice. In turning over the file at intervals I extract what suits my purpose, annexing the true or *most probable* date, and retrenching what is extraneous or irrelevant in matter or phrase.

If the conductors of our London papers intend (as without doubt they do) that the many notices of the weather and phenomena with which they favour us, should promote science as well as gratify curiosity, they will not be displeased at my requesting them to give us these *with a precise date.* A provincial editor naturally reverts to the day of the week on which a thing happened, and the date of *his* paper settles that of the event. But when the latter comes to be transplanted into a subsequent London paper, sometimes with, sometimes without, the corrective addition to the day, of *se'nnight*, or *fortnight*, the uncertainty is often such as to render it useless to the accurate collector. The day of the month being adhered to in all cases, would obviate the inconvenience.

The *language* of these accounts is also commonly vague and unphilosophical: a hard gale of wind is too often " a tremendous hurricane," and frost and floods, hail and thunder, are too frequently stated to have been the most severe or destructive "in the memory of the oldest persons living!" Reporters of unusual phenomena should be cautioned to describe, as accurately as they can, in the first place *what they saw*, and in the true *order of time:* after which, if necessary, they may draw comparisons, and give vent to their feelings. I am, however, indebted to the public papers for several circumstantial reports, evidently communicated by men of science; with which the reader may find it not unpleasant to relieve his attention, in looking through this volume for dry facts and coincidences; and from some of which he may possibly be induced to draw the conclusion, that the milder uniformity and tameness of our own climate, are, at least, equally desirable with the more splendid and various, but destructive, phenomena of other zones.

◆

Some disadvantage, I am sensible, attends the publication of this first volume, while the second is as yet not nearly ready to appear. The reader may possibly be disposed to compare this collection of facts at the first view to the parts of a dissected map, turned out before him without the accompaniment of a design, by the aid of which he might put them together. But in this I have followed the natural course of the labour imposed on me by the undertaking. To make out of the detached portions of observations which had been separately formed, *a whole* was the first thing to be done. And this was most easily accomplished by putting them at once to the press, and supplying what was necessary to complete the series, as the work proceeded. They were thus brought into a fit state to be perused for the purpose of theory and deduction, in which considerable progress is already made. Until the results can be laid before the public, what is now produced may serve the purpose of reference, and occasional information on various points of the history of our climate, for the series of years comprehended in the tables. Persons moderately conversant with natural philosophy, will know how to make use of them in this way: still more, they who have been accustomed to make similar observations for themselves. There are indeed but few at present who can be said to *study* the subject, compared with the number of amateurs in chemistry, in astronomy, in electricity, &c. Yet it is one with which gentlemen possessing the requisite information, together with domestic habits, might very agreeably fill up a portion of their daily leisure. There is nothing splendid or amusing to be met with in the outset of such a course: but, I believe, that even in more attractive pursuits, the pleasure of study resolves itself sooner or later into the feeling of the gradual acquisition of knowledge, the perception of the relations, agreements, and differences of facts, and their orderly arrangement in the mind. Now, in no one department of natural knowledge is the field less trodden, or the opportunity for a successful exertion of the judgment in establishing general principles greater, than in meteorology in its present state. There is no subject on which the learned and the unlearned are more ready to converse, and to hazard an opinion, than on the weather—and none on which they are more frequently mistaken! This alone may serve to show that we are in want of more *data*, of a greater store of facts, on which to found a theory that might guide us to more certain conclusions; and facts will certainly multiply together with observers. He who wishes to study astronomy (the most perfect, perhaps, because the most ancient of the sciences), must begin, I imagine, where the Chaldeans began, though with so much better means before him:—he must remark for himself in the heavens, the actual courses of the planets, and the most obvious points in the construction of our own system. So, to become qualified to reason on the variations of our own climate, we should begin by making ourselves familiar with their extent and progress, as marked by the common instruments, and the common natural indications: for which purpose such a model as the present volume may be found very serviceable. A moderate knowledge of the phenomena acquired in this way, will naturally excite a desire to become acquainted also with their causes, and eventually, with the principles of the science. These have been ably investigated in parts by several writers: in our own language, by Franklin, Cavallo, Kirwan, Dalton, Marshall, Wells: in French, by Saussure, De Luc, Cotte, Bertholon: a work by Beccaria is extant in an English translation; and there are many detached extracts of the opinions of foreign authors, as well as essays of minor bulk, dispersed in the Philosophical Transactions, and other periodical publications. Dr. Thomson has given a good summary of meteorological facts in the former editions of his System of Chemistry; and Dr. Robertson has done the same in a separate work. But we are not as yet possessed of a general elementary treatise, displaying in a sufficiently familiar manner the present extent of the science; which from this cause appears more confined and imperfect than it really is. In the early part of this introduction, I made mention of some lectures on meteorology, which I had a view of publishing. These are necessarily a more remote object than the completion of the present work. I must, therefore, entreat the patience of my friends in regard to these: for while I have long owed such a work to the public, the materials have been accumulating, and the labour of selecting and arranging in a small compass, what may be deemed fittest for the purpose, is likely to be yet considerable.

ERRATA ET CORRIGENDA.

Table 1. line 15—Barometer 39·83 read 29·83.

11. in the references—*e* read *c*.

23, 24. The lunar phasis omitted: which, with several inaccuracies discovered in the placing of these, will be rectified by a table of them all.

25. line 24 in the reference *b* read *l*.

50. *omitted* November 18, SW—29·25—29·17—51°—45°.

51. line 14—The maximum and minimum of pressure appear to be reversed.

52. at bottom; minimum of temperature 53° read 33°.

58. in the notes, fourth page, line 6 from bottom; *burnt* read *burst*.

64. in the notes, fifth page, line 10; No. 1, read No. 2.

102. in the notes, second page, line 6 from bottom: *burn* read *burnt*.

Meteorological Observations

MADE AT

PLAISTOW, NEAR LONDON,

IN THE YEARS

1806, 1807, 1808, 1809,

ARRANGED IN LUNAR PERIODS.

(First published Monthly in the Athenæum.)

TABLE I.

	1806.	Wind.	Pressure.		Temp.		Evap.	Rain, &c.
			Max.	Min.	Max.	Min.		
11th Mo.	New M. *a*. Nov. 10	N	30·10	30·10	48°	40°	—	
	11	SW	30·10	29·98	50	33	4	
	a. 12	SW			47	34	—	
	13	SW	30·18	29·98	57	48	4	
	14	SW	29·98	29·86	53	48	3	1
	15	SW	29·86	29·70	53	37	6	1
	16	SW	29·88	29·70	48	39	10	
	b. 17	SW	29·82	29·70	53	43	8	
	1st Q. 18	SW	29·70	29·58	55	47	11	4
	d. 19	SW	29·25	29·01	51	35	7	63
	20	SW	29·34	29·04	47	35	15	
	b. *c*. 21	SW	29·33	29·00	45	31	8	2
	b. *c*. 22	W	29·63	29·33	43	27	4	
	b. *c*. 23	SW	29·83	29·46	51	33	2	2
	24	SW	39·83	29·65	56	52	8	
	25	SW	29·46	29·26	57	47	8	3
	Full M. *b*. 26	SW	29·88	29·46	50	39	4	18
	27	NW	30·01	29·90	56	41	0	17
	28	SW	30·04	29·64	60	54	8	2
	e. 29	SW	29·69	29·53	58	36	20	
	30	W	29·69	29·13	45	33	6	4
12th Mo.	*f*. Dec. 1	SW	29·13	28·63	50	38	8	30
	L. Q. *g*. 2	W	29·59	28·63	42	38	8	1
	3	NW	29·67	29·63	43	31	3	2
	4	W	29·67	29·45	50	38	2	2
	5	SW	29·45	29·27	54	48	20	
	6	SW	29·30	29·25	58	33	12	
	7	W	29·03	29·00	47	38	7	6
	8	Var.	29·28	29·00	45	36	0	17
	9	NW	29·42	29·33	44	33	3	9
			30·10	28·63	60	27	1·99	1·84

Notes.—*a*. Misty, the trees dripping without rain.

b. Lunar halo; very brilliant on the nights of 22 and 26. Two series of the prismatic colours were distinguished.

c. Hoar frost. Some hail on the 21st.

d. The barometer appeared to have descended still lower. Pretty strong signs of *positive* electricity the 18th p. m. after which very stormy from midnight to sunrise

e. Wind NW; at 8 p. m. slight shower from a mass of clouds passing in the S, in which it is said to have lightened. On examination a changeable electricity was found in the insulated conductor.

f. Very stormy night.

g. Loud thunder about 3 a. m. a *positive* electricity after sunrise. Soon after 2 p. m. a squall from the NW, with snow and finally rain. The conductor was highly charged *pos.* giving dense sparks. In proportion as the nimbus passed off to the SE this went off and a weaker *negative* charge succeeded.

Additional Notes from the MS. Register.—Eleventh Mo. 27. I found the vapour point about noon but one degree below the actual temp. of the air: hence no evaporation. 30. Much wind.

Twelfth Mo. 1. The barometer took to rising again at sunrise, at 2 p. m. a squall coming on, the electricity became *negative.*

RESULTS.

The prevailing wind has been decidedly SW; often amounting to a gale, more especially in the intervals between midnight and sunrise.

Mean barometrical pressure 29·54 in.; the column almost constantly in motion.

Mean temperature, by Six's thermom. 44·6°.

Total evaporation 1·99 in. This is probably greater than the evaporation at the surface of the earth, the gauge being at an elevation of 30 feet.

Total of rain 1.84 in. being a small amount for the season, though showers have been frequent. Rain noted as fallen by day 0·54, by night 1·30 in.

TABLE II.

	1806.	Wind.	Pressure. Max.	Pressure. Min.	Temp. Max.	Temp. Min.	Evap.	Rain, &c.
12th Mo.	New M. Dec. 10	SW	29·33	29·33	43°	37°	2	1
	a. 11	SW	—	—	49	39		4
	a. 12	SW	29·36	29·03	55	40		3
	a. 13	SW	29·35	28·98	55	44		12
	a. 14	SW	29·55	29·27	52	40		51
	15	SW	29·76	29·60	53	38	10	5
	16	SW	29·60	29·56	55	52	7	
	17	SW	29·65	29·56	55	48	8	9
	1st Q. 18	SW	29·56	29·51	50	44	3	12
	19	S	39·61	29·45	52	36	5	
	b. 20	S	29·25	29·19	51	37	9	6
	b. 21	Var.	29·66	29·43	49	32	2	28
	b. 22	SW	29·82	29·63	55	49	10	
	23	SW	29·93	29·82	56	53	7	1
	b. 24	Var.	30·35	30·12	56	33	2	2
	Full M. 25	SW	30·17	30·00	55	38	9	1
	c. 26	SW	30·19	30·10	44	42	4	
	27	SW	30·10	29·85	51	42	4	
	28	SW	29·85	29·50	52	42	8	
	29	S	29·49	29·43	51	38	4	2
	30	Var.	30·00	29·43	53	40	4	3
1807.	*d.* 31	N	30·48	30·00	41	26	—	
1st Mo.	L. Q. *d.* Jan. 1	N	30·60	30·48	38	27	—	
	d. 2	W	30·60	30·33	30	28	—	
	e. 3	W	30·25	30·20	38	30	4	
	4	N	30·46	30·25	40	33	3	
	5	NW	30·47	30·45	38	22	—	
	6	W	30·45	30·33	33	25	2	
	f. 7	W	30·33	30·08	39	23	0	
			30·60	28·98	56	22	1·07	1·40

NOTES.—*a.* Very stormy nights. Suspecting too great an effect of the wind on the water in the evaporation gauge, these four results are omitted, and precaution taken to increase the shelter.

b. Lunar halo; succeeded (as usual) by wind, on 23, 24, 25.

c. The highest tide that has occurred, it is said, during fifteen years. In the last spring-tides, the addition of heavy rain caused a pretty considerable overflow of the River Lea. The present elevation seems to be independent of rain in these parts.

d. Hoar frost. 31. Bright day quite to sunset: 1. misty: 2. very misty and much rime. This gradation towards moisture is against the continuance of frost.

NOTES, &c. (*continued*).

e. At 10 a.m. wind W; the melted rime descended in showers from the trees. There was enough on the rain gauge to make 0·02 in. when melted. Such an amount of rain would have wetted the ground considerably; which however is dry, save under the trees. Rime is a peculiar *cristallization* from a freezing mist. Hence its abundance on surfaces opposed to the wind.

f. At sunrise, an unusually ruddy sky.

Additional Notes, &c.—20. Fine day. *Cirrus* passing to *Cirrocumulus*, &c. rather stormy evening. 21. Clear evening, wind NW, having gone round by E. 24. At noon, a sudden change of wind to N with a shower. 31. *Cirrus* at sunset. The catkins of the filberts expand prematurely.

" On the 25th Dec. a hedge sparrow's nest was taken at Doveridge, Derbysh. with four eggs; and near Warwick, a green linnet's, with two eggs. It is worthy of remark, that the heat was the same on the 24th Dec. as on the 24th June last; on both those days the thermometer being nearly 60°."—(ATHENÆUM.)

RESULTS.

The south-west wind, which had so long reigned, yielded, just at the close of the year, to the north and west. Some frost ensued, which however had not the characters of permanence, being neither ushered in by driven snows nor accompanied with a dry and serene atmosphere. Mean height of the barometer 29·84 in. Mean temperature 42·53°.

Evaporation in 25 days 1·07 in. Rain 1·40, of which by day 0·67, by night 0·58 in.

The effects of the late high winter temperature on vegetation must have been obvious to every one who has seen the country. To the very close of the year the grass continued to grow, the daisies to enamel the turf, and many of the inmates of our gardens (native and exotic) to thrive and blossom. Even hyacinth bulbs, left in the open beds, shot up and flowered. Ten years ago winter came on six weeks earlier, and with considerable severity.

r III.

				Wind	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
			[illegible]	NE	30·08	29·78	42°	26°	—	
			[illegible]	S	29·88	29·76	46	36	3	
			[illegible]	E	30·20	29·88	42	27	—	
			11	W	30·20	30·08	38	29	—	
			12	SW	30·08	29·66	45	38	4	
			13	NW	29·97	29·66	44	23	4	—
			14	W	30·03	29·97	35	13	—	—
			15	SW	29·97	29·66	47	15	4	9
			16	NW	29·90	29·87	51	41	4	
			17	SW	29·87	29·52	51	37	3	
			18	W	29·63	29·50	42	27	—	
			19	Var.	29·50	29·00	45	28	—	18
			20	SW	29·05	28·98	40	27	—	
	f.		21	NE	29·20	28·80	41	27	—	2
			22	E	29·54	29·04	38	31	—	17
			23	NW	30·08	29·54	41	28	8	
Full M.	e.		24	W	30·43	30·08	43	23	—	
	e. g.		25	SW	30·49	30·43	27	25	—	
	e.		26	SW	30·45	30·43	41	27	4	2
			27	NW	30·50	30·45	44	31	—	
	e.		28	NW	30·54	30·40	43	28	—	
			29		30·40	30·10	42	28	6	
L. Q.			30	W	30·10	29·84	38	33	3	
	h.		31	W	—	—	42	28	—	—
Mo.		Feb.	1	N	29·84	29·57	35	18	—	—
			2	S	29·57	28·90	39	26	8	39
			3	W	—	—	39	28	—	—
			4	SW	29·24	28·90	40	28	7	9
			5	W	29·33	29·24	43	29	—	
			6		29·65	29·33	45	31	9	2
					30·54	28·80	51	13	0·76	0·98

Notes.—a. Misty.

b. A squall with rain at 2 p.m.

c. Snowy, p. m.

d. A faint but large solar halo for two or three hours. After sunset the wind rose, and the night was stormy with rain.

e. Hoar frost, and on the 26th, much rime with a thaw after it.

f. A very damp chilling atmosphere, there being a prodigious quantity of cloud, but as yet no wind or rain answerable to the great depression of the barometer.

Very foggy evening. It appears from the papers that a great wind occurred about Exeter on the 22d.

k. This day, about noon, the haze which had long occupied the higher atmosphere, became arranged in broad parallel bars of *Cirri*, extending NE and SW beyond the horizon. In the latter quarter some appearance of denser clouds forming below the haze. The evening proved calm, with sunshine; but there followed in the night a brisk gale with heavy rain and snow, from the north. The latter fell also, but in small quantities, on the 2d, 3d, and 4th inst.

RESULTS.

Prevailing Winds Westerly.

Mean elevation of barometer	29·78 in.
Mean temperature	34·75°
Evaporation	0·76
Rain	0·98 in.

The character of this period has been on the whole frosty, the temperature having usually fallen at night below 32°, though the vaporous state of the atmosphere has given occasion to frequent remissions with rain. Of this there fell by day 0·17, by night 0·31: the remainder was not divided.

The gravity of the air has undergone some notable changes. From the 1st to the 24th ult. the result of its frequent variations was a loss on the whole equal to 1¼ in. of quicksilver. In four days, from the 20th, this quantity was restored, the rapid movement necessary to this effect being chiefly felt, as it seems, on the south coast. The increase was retained just four days; and in four days more, the whole, except the weight of two-tenths of an inch in the barometer, was again parted with. These effects resemble the increase, continuance, and subsiding of an inundation; and possibly the cause of this sudden swell may have been the meeting of simultaneous opposing currents from the north and south, which, after taking some time to unite and assume a new direction, passed off to the eastward.

TABLE IV.

	1807.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
2d Mo.	New M. Feb.	7	NW	29·85	29·67	43°	28°	6	6
		8	SW	29·58	29·50	48	36	4	10
	a.	9	SW	29·53	29·28	52	37	11	4
		10	W	29·77	29·65	51	39	10	
		11	W	29·98	29·77	57	49	11	
		12	SW	30·15	30·15	57	38	11	
		13	SW	30·18	30·15	53	38	5	
		14	Var.	30·15	30·03	54	31	6	
	1st Q. *b.*	15	S	30·03	29·87	54	37	7	
	c.	16	SW	29·72	29·64	55	37	3	
	d.	17	Var.	29·49	29·33	45	24	—	
		18	N	30·06	29·49	29	23	—	
	e.	19	Var.	30·18	30·11	35	22	—	
		20	SW	30·11	29·73	46	34	17	10
		21	W	29·72	29·67	46	35	10	
	Full M.	22	W	29·69	29·57	49	32	8	1
	f.	23	NW	29·88	29·69	44	28	6	
	g.	24	W	29·69	29·48	51	34	8	11
		25	SW	29·68	29·47	56	34	5	2
		26	NW	29·92	29·68	39	25	7	
	h.	27	N	30·38	29·92	37	26	2	
	h.	28	N	30·56	30·38	38	27	5	1
3d Mo.	L. Q. March	1	NE	30·56	30·50	42	31	4	
		2	NE	30·50	30·17	44	35	5	1
		3	Var.	30·17	29·84	44	31	5	
		4	N	29·84	29·83	43	23	—	
	h.	5	N	—	—	33	19	—	
	h.	6	W	29·86	29·66	38	23	10	11
	h.	7	N	29·97	29·77	40	23	—	
		8	W	29·77	29·30	45	31	8	5
				30·56	29·28	57	19	1·74	0·62

NOTES.—*a.* A gale of wind.

b. A very fine day. A thermometer against a wall facing the south rose to 87°. About sunset the clouds came down as in summer evenings before thunder.

c. A very large and distinct lunar halo.

d. Stormy indications at sunset, followed by a severe and destructive gale from the NE which was not over till the next night; much lightning between 3 and 4 a. m. the 18th; abundance of snow fell on the more hilly parts of the country, though but a moderate quantity here.

e. The whole hemisphere very red for some time after sunset, which we ascribed to the reflection of light from elevated *Cirri*. Our Manchester correspondent, however, states the same phenomenon at the same time as an *Aurora Borealis*. Additional communications, decisive of this point will be acceptable. The phenomenon was repeated on the 21st, which, with the preceding and following night, was windy.

f. The *Cirrus* cloud continues to fill the higher atmosphere, and is now collected into parallel bars extending E and W beyond the horizon.

g. Hoar frost, with a strong positive electricity, which was found again at sunset in some rain, mixed with sleet.

h. Small quantities of snow at intervals; the atmosphere sensibly tending to a state of greater dryness.

Additional Notes, &c.—Second Mo. 7. At sunset, the shadows of large *Cumuli* were projected on the haze above them, and there was a bank of *Cirrus* and *Cirrostratus* in the W. 8. *Cirrostratus* at sunset, finely divided and wavy. 17. At sunset, a bank of *Cirrostrati* obliquely crossing some *Cirri* which pointed northward. 21. Very red *Cirri* at sunset. 26. A complete evaporation of the denser clouds in the evening. 27. A brilliant morning.

Third Mo. 7. *Cumulus* and *Cumulostratus*, which nearly evaporated at sunset leaving a red haze. 8. Overcast for rain*.

RESULTS.

Prevailing Winds Westerly.

Mean elevation of the barometer........	29·86 in.
Mean temperature......................	38·21°
Evaporation	1·74 in.
Rain, &c............................	0·62 in.

Character of the period, frosty, with a dry atmosphere for the most part.

Rain noted by day 0·10, by night 0·25 in.

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* An immense ball of fire was observed at Glasgow on Friday night, the 6th of March, fifteen minutes before ten o'clock, directing its course (seemingly) from SE to NW, with a very long streaming tail, and, towards the end, of a sparkling appearance. (PHILO. MAGAZINE.).

TABLE V.

	1807.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
3d Mo.	New M.	March	9	NE	29·93	29·30	39°	29°	9	9
		a.	10	NE	—	—	38	28	11	
		a.	11	NE	30·20	29·93	37	31	16	
			12	NE	30·17	30·13	42	34	16	
		a.	13	NE	30·13	30·06	45	31	11	
		a.	14	N	30·06	29·92	39	26	3	
		a.	15	NW	29·98	29·84	40	18	7	
			16	NW	29·40	29·33	37	26	—	
	1st Q.	*b.*	17	NW	29·43	29·28	42	28	14	1
			18	SW	29·60	29·28	52	28	14	
			19	SW	29·97	29·60	49	26	12	
		b.	20	W	30·14	29·97	51	31	9	
		b.	21	Var.	30·33	30·14	60	36	4	
			22	E	30·44	30·33	54	31	15	
	Full M.		23	E	30·41	30·33	42	28	—	
			24	NE	30·41	30·29	42	28	—	
		c.	25	NE	30·29	30·18	44	33	52	
		a.	26	N	30·18	29·79	42	35	5	2
		a.	27	N	29·79	29·70	43	35	7	
		a.	28	NE	29·69	29·68	42	33	7	
		a.	29	NE	—	—	45	28	—	
	L. Q.	*a.*	30	NE	29·78	29·63	42	29	—	
		a.	31	Var.	29·47	29·43	48	29	22	33
4th Mo.		April	1	NE	29·68	29·47	48	31	4	
		a.	2	N	29·77	29·68	34	27	0	4
			3	N	30·06	29·77	42	22	—	
			4	SW	30·18	29·93	45	23	13	
			5	SW	—	—	50	24	—	
			6	SW	30·02	30·00	50	24	14	
		d.	7	Var.	30·15	30·00	57	34	7	
					30·44	29·28	60	18	2·72	0·49

NOTES.—*a.* Snow in very small quantities till the 31st, when it was more plentiful, and followed by rain. On the 2d the trees and shrubs were much loaded all the forenoon, and it lay in the drifts several days.

b. Lunar halo.

c. About 8 p. m. a steady light in the NW, probably *Aurora Borealis;* it disappeared gradually after a flash of lightning in the SE. There were clouds in each quarter, but of no great density. *Dies albo calculo notandus!* not, however, on account of the weather, but for the accomplishment of a long deferred national act of justice in the abolition of the Slave Trade.

NOTES, &c. *(continued).*

d. A fine spring day. Bats began their usual excursions in the twilight. Considering that these animals pursue small insects by the sense of hearing alone, their agility is surprising; and the silent motion of their leathern wings is admirably adapted to the purpose.

Additional Notes, &c.—Third Mo. 10. Frequent slight showers of granular snow, (or the *nuclei* of hailstones.) 15. A little opake hail. 18. a. m. *Cumulus* clouds with a veil of *Cirrus* above: windy, with a little rain at sunset. 21. A light breeze varying from W by N to E. 22. A steady breeze E. 25. Idem NE. 26 to 31. *Cumulostratus* daily, with a clear sky above, and now and then, granular snow.

RESULTS.

Prevailing Winds between North and East.

Mean elevation of barometer	29·94 in.
Mean temperature	36·28°
Evaporation	2·72 in.
Rain and snow	0·49 in.

Character of the period dry, frosty, and cloudy, with a high degree of transparency in the lower air. Rain, &c. by day 0·08, by night 0·42.

TABLE VI.

	1807.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
4th Mo.	New M.	April	8	SW	30·23	30·15	63°	30°	5	
		a.	9	S	30·23	29·98	61	39	19	
		b.	10	SW	—	—	55	43	—	
			11	SW	29·98	29·30	57	45	32	
		c.	12	SW	29·30	29·25	59	42	23	
		d.	13	Var.	29·28	29·22	59	33	10	
			14	Var.	29·28	29·25	61	44	7	16
	1st Q.	*e.*	15	NE	29·39	29·28	51	39	10	
			16	Var.	29·66	29·39	43	37	10	
		f.	17	N	29·78	29·77	42	25	—	—
			18	N	29·87	29·78	46	28	11	—
		g.	19	NE	30·12	29·87	50	29	11	1
			20	NE	30·16	30·12	45	30	12	
			21	SE	30·12	29·95	51	29	7	
	Full M.		22	S	29·89	29·88	51	41	9	
			23	SW	—	—	62	43	—	
			24	Var.	30·08	29·89	60	47	—	
			25	E	30·17	30·03	69	40	84	
		h.	26	E	30·10	30·06	68	41	25	
		i.	27	SW	30·03	29·98	80	52	35	
			28	W	30·03	30·02	70	49	13	
	L. Q.	*k.*	29	NE	30·02	29·88	72	46	17	4
			30	E	29·88	29·75	73	49	32	
5th Mo.		May	1	E	29·75	29·70	78	50	24	
		l.	2	Var.	29·67	29·63	79	49	21	
			3	Var.	29·63	29·60	71	49	16	22
			4	E	29·60	29·34	58	50	5	15
			5	SE	29·34	28·98	71	51	12	30
			6	SW	29·09	28·90	61	49	21	1
					30·23	28·90	80	25	4·21	0·85

NOTES.—*a.* A serene atmosphere, with a strong *positive* electricity the whole day. The pith-balls of the conductor diverged half an inch.

b. Windy, with a little rain, which was *negative.*

c. Barometer stationary about twenty hours, the air *positive.*

d. About 9 p.m. a meteor passed from the zenith to the south; there fell much dew in the night, and rain followed in some quantity.

e. A single swallow on the wing.

f. Several more of these harbingers of warm weather, which, however, met with a most inhospitable reception in a storm of snow and sleet, continuing most part of the day.

g. p.m. Many distinct *Nimbi* traversing the country in different quarters, and discharging showers of *hail*, which was highly charged with electricity. One of these, being carefully examined throughout, presented the following phenomena. While the cloud was on the horizon in the NE and the shower behind it, the pith-balls of the insulated conductor remained in contact. When the extremity of the upper surface of the inverted cone of cloud had arrived in the zenith, they opened *negative*, and diverged slowly to full two inches, at which time pretty strong sparks were drawn from the conductor. During the remainder of the approach of the shower, they gradually closed again. At the moment when the latter began to touch the observatory they opened *positive*, diverged more speedily, and the apparatus gave strong sparks for a considerable time, *positive*. As the cloud drew off to the SW, this charge gradually ceased, and the balls opened again *neg*. diverging gradually as before, then converging, and lastly were left a little charged *pos*. The reader who is conversant in electrical phenomena will see in all this the natural effects of the high positive charge in the column of falling hail, which might be six or seven miles in diameter, and which appeared to be surrounded with a negative *area*, extending into the dry atmosphere about three miles in every direction. Could the descent of the electric fluid have been rendered as obvious to our senses over the whole tract, as was that of the hail, its conductor, we should have pronounced it a shower of fire rather than of ice; for the latter, when melted into the rain gauge, made no more than one hundreth of an inch along with several previous showers.

h. First notes of the cuckow.

i. About 9 p.m. a sudden shower, which gave to the conductor a strong *negative* charge continuing some time after it. The air before was *positive*.

k. A mist from the Thames.

l. After repeated indications of strong electricity in the clouds for some days past, thunder was heard at intervals, in a *Nimbus* situated in the W and NW. Signs of negative electricity followed, for a few minutes only, when the edge of this cloud approached us. Soon after a breeze coming on from SW, this, with other clouds of the same kind, which had formed in the E, S, and SW, drew off to the northward, where they remained visible on the horizon till late at night, the lightning playing among them almost incessantly. Much rain followed on the ensuing days, which was several times examined, and found *positively* charged.

Additional Notes, &c.—Fourth Mo. 9. Very serene and warm, *Cirri* pointing N, and *Cirrostratus* evening; the wind brisk. 10. *Cirrostratus* in abunda ance the whole day. 12. At sunset the *Cumuli* evaporated, *Cirrus* and *Cirrostratus*, with much dew succeeded.

Fifth Mo. 5. Rain the whole evening at first non-electric, then strongly positive at intervals.

THUNDER STORMS.

At Poulton-in-the-Fylde, Lancashire, and the neighbourhood, on Thursday the 30th of April, and the two following days, there was the most tremendous thunder and lightning ever remembered by the oldest persons; on Friday, particularly so. As a girl, aged thirteen, was returning from school, in Poulton, about seven in the evening, she was struck dead within half a mile of the town: her bonnet, cloak, stockings, and shoes, were burnt or torn in pieces, several parts of which were carried into the hedge; she had a gallon of rum in a stone bottle, wrapt up in her apron, which there is no doubt exploded, as several pieces were found at a considerable distance from the spot. Two sheep were killed near Poulton, and the ground near where they lay was perforated in several places, and burnt—Great Marton Mill had three of its sails shivered in pieces, and the top set on fire; a large iron chain, which draws up the corn, was melted to a rod of iron, and as the bottom did not reach to the floor, considerable damage was done below it, such as tearing up the boards, &c.—On the same day, there was a dreadful thunder storm at Preston, attended with vivid and continued lightning, a fall of rain so heavy as to be compared to the setting in of the rainy season in Africa, and hail so large, that some of the stones measured three inches in circumference; it broke windows and sky-lights innumerable.—The storm was also severely felt at Lancaster, York, and many other places.—At Bakewell, in Derbyshire, hailstones fell, intensely frozen, from two to four inches round, and many windows were broken.

The inhabitants of Silkstone, near Penistone, Yorkshire, were visited by one of the most alarming phenomena ever remembered. The clouds had portended rain, but none had then fallen there, when suddenly a torrent of water deluged the town, which is situate in a valley, and several persons were unfortunately drowned. The greatest transition from cold to heat ever remembered had been observed in the last week in April, and the above inundation was occasioned by a mass of clouds, during the thunder storm, bursting in a field in the township of Bradfield, the waters taking their course down the Rivelin and Loxley, and thence into the Dun, which became suddenly swollen. Near Doncaster it is said to have risen nine feet in the space of an hour and a half. A great number of windows were broken, at Heckleton, during a severe hail storm the same evening. Pieces of ice of an oblong form exceeding five inches were picked up.—(ATHENÆUM.)

Process employed in the Maçonnais of France to avert Hail and dissipate Storms.

Mag. Encyclopedique, T. 2. p. 5.

This process, which is now universal in the part of France named in the title, was originally introduced by the Marquis of Cheviers, a naval officer; retired on his estate at Vaurenard, about 35 years ago, who having recollected to have seen the explosion of guns resorted to at sea in order to disperse stormy clouds, resolved to attempt a similar method to dissipate the hail storms, whose ravages he had often witnessed. For this purpose he made use of boxes of gunpowder, which he caused to be fired from the heights on the approach of a storm; this had the happiest effect, and he continued till his death to preserve his lands from the ravages of hail storms, while the neighbouring villages frequently experienced their baneful effects. He consumed annually between 200 and 300lb. of mining powder. The inhabitants of the communes where the estate of the Marquis was situated, convinced of the excellence of the practice, from the experience of a great number of years, continued to employ it. Their example was followed by the surrounding communes; and the practice gaining ground, is at this moment in use in the communes of Vaureuard, Iger, and many others. The size of the powder boxes, their charge, and the number of times they fire them off, vary according to circumstances, and the position of the places. In the commune of Fleury they use a mortar which carries a pound of powder at a charge; and it is generally upon the heights, and before the clouds have had time to accumulate, that they make the explosions, which they continue until the stormy clouds are entirely dissipated. The annual consumption of gunpowder for this purpose, from the magazine at Maçon, is from 1300 to 1600lb.—(ATHENÆUM.)

RESULTS.

Winds variable. Mean elevation of barometer 29·73 in. Its movements offer nothing remarkable, the rain having been preceded as usual by continued depressions of the column.

Mean temperature.............. 51·12°
Evaporation .... 4·21 in.
Rain, &c...................... 0·85.

The most prominent feature in this period is the almost constant strong electrisation of the atmosphere, which terminated, though not in this part of the country, in violent thunder storms. Rain by day 0·30. By night 0·54.

TABLE VII.

	1807.	Wind.	Pressure, Max.	Pressure, Min.	Temp. Max.	Temp. Min.	Evap.	Rain, &c.
5th Mo.	New M. *a*. *b*. May 7	SW	29·58	29·13	58°	44°	15	2
	c. 8	SW	29·58	29·27	57	49	11	24
	9	Var.	29·30	29·23	58	46	7	11
	b. 10	Var.	29·80	29·30	51	41	7	19
	d. 11	Var.	29·80	29·56	59	48	6	33
	e. 12	SW	29·44	29·38	59	52	13	—
	13	Var.	29·70	29·44	64	46	11	37
	1st Q. *f*. 14	SW	29·72	29·60	56	49	4	30
	g. 15	SW	29·79	29·72	64	45	10	12
	16	SW	—	—	—	—	—	
	17		—	—	—	—	—	
	18		30·30	29·79	69	41	53	
	19	NE	30·30	30·18	59	44	14	
	20	NE	30·18	30·02	62	45	16	
	Full M. 21	NE	—	—	—	—	—	
	22	NE	30·13	30·10	68	42	61	
	23	E	30·10	29·93	75	49	32	
	24	E	29·93	29·70	82	52	28	
	h. 25	Var.			85	56	—	
	i. 26	SW	29·72	29·66	70	54	60	
	27				63	46	—	
	k. 28				—	—	—	—
	L. Q. *l*. 29	NE			63	39	—	—
	m. 30	E	29·75	29·62	55	42	48	60
	31	E	29·80	29·78	54	46	13	—
6th Mo.	*b*. June 1	S	29·83	29·78	63	45	7	21
	n. *b*. 2	Var.	29·89	29·88	68	49	9	1
	3	NW	30·06	29·89	70	47	12	
	4	NW	30·06	30·03	66	47	10	
	5	Var.	30·03	29·88	68	52	11	23
			30·30	29·13	85	39	4·58	2·73

NOTES.—*a*. Strong *positive* electricity in the intervals of the showers. A pair of pith-balls, loaded with lead, so as to weigh ten grains, and suspended from the conductor by threads of the length of seven inches, exhibited a curious phenomenon. Besides the waving motion, during their divergence, which is not unusual, there was a sensible impulse of the fluid downward upon the balls, causing the threads to quiver incessantly like an insect's wing.

b. Rainbow.

c. Much wind at SW. *Negative* electricity, from a *Nimbus* going by in the S.

d. At 6 p.m. changeable electricity, from a *Nimbus* in the N, in which it thundered.

e. A strong wind at SW with much *scud*,* the rain strongly *positive*.

f. Almost incessant rain, which was void of all signs of electricity.

g. Rain still non-electric, and the air strongly and variably charged in the fair intervals.

h. Lightning in the W.

i. After a constant exhibition of the *Cirrus* cloud for several days past, with much dew, the latter deposition is suspended, and the sky overcast and threatening.

k. Hoar frost this morning, and a *Stratus* on the river and meadows after sunset.

l. Very stormy night; the newly expanded foliage suffered much.

m. Rain the whole day.

n. Strongly positive atmosphere.

Additional Notes, &c.—Fifth Mo. 7. The bow appeared very bright and perfect twice; at 4 and at 7 p.m. 26. For five days past the *Cirrus* cloud has appeared over the whole sky, with the points directed upward.

RESULTS.

Winds Variable.

Mean elevation of barometer	29·78 in.
Mean temperature	55·41°
Evaporation	4·58 in.
Rain	2·73.

There have been almost continual indications of an active state of the atmospheric electricity; a result which seems naturally allied to the variable state of the currents, and a much greater deposition of water than is usual at this season. Rain noted as by day 1·38, by night 0·56.

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* Loose shapeless portions of cloud moving swiftly in the lower current of the atmosphere.

TABLE VIII.

	1807.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
6th Mo.	New M.		June 6	Var.	29·88	29·58	62°	48°	4	91
		a.	7	SW	29·57	29·55	67	51	6	2
		b.	8	SW	29·68	29·57	68	52	19	
			9	SW	29·93	29·68	68	45	23	
		c.	10	SW	29·95	29·92	65	57	16	6
		c. d.	11	SW	30·10	29·90	70	44	16	
		c. e.	12	W	30·15	30·10	69	44	17	
	1st Q.		13	W	30·10	30·05	69	46	20	
			14	SW	30·05	29·90	70	46	13	
		f.	15	Var.	29·90	29·62	78	48	21	
		g. h.	16	W			74	46	—	
		g.	17	NW	29·95	29·62	68	49	44	
			18	NW	30·16	29·95	67	43	14	
			19	NW	30·17	30·16	66	42	12	
	Full M.		20	NW	30·28	30·09	69	47	16	
		i.	21	NW	30·18	30·10	72	53	16	
			22	NW	30·02	30·00	74	53	—	
		k.	23	Var.	30·00	29·92	67	51	35	
			24	Var.	29·92	29·76	71	47	21	
			25	NE	29·81	29·76	75	54	—	
			26	NW	29·88	29·76	79	54	36	
		l.	27	NW	29·92	29·90	74	54	17	
	L. Q.		28	NW	29·90	29·86	69	43	14	
		m.	29	NE	29·86	29·81	69	46	13	
			30	N	29·81	29·79	65	52	10	
7th Mo.		*n.*	July 1	W	29·85	29·81	65	48	9	
		i.	2	SW	29·81	29·81	71	54	26	
			3	W	29·86	29·81	64	54	11	
			4	Var.	29·93	29·86	66	45	8	
					30·28	29·55	79	42	4·57	0·99

Notes.—*a.* Thunder at intervals.

b. Some lightning in the evening.

c. c. c. Much wind by night.

d. Slight solar halo.

e. Hoar frost.

f. A beautiful display of the *Cirrus* cloud all day.

g. g. Some indications of a tendency to thunder. The rod was charged *negative*, but the clouds at length passed off to NE.

i. i. Brisk winds.

k. The wind went from NW by E to SW.

NOTES, &c. (*continued*).

l. Clouds highly coloured ~~at sunset.~~ The wind, as usual after this appearance, veered eastward.

m. A *Stratus* on the river and meadows this morning, owing, probably, to the sudden depression of the nocturnal temperature.

n. Abundance of *honey dew* *, on the elms and limes, as well as on the fruit trees.

Additional Notes, &c.—Sixth Mo. 4. The clouds, which have become daily more dense, now show for thunder: there are wanting however the concurrent indications of active electricity and a temperature above 80°. A few drops of rain to-day were wholly unelectrified.

" *Lisbon June* 12, 1807.

" On the 6th inst. at ten minutes before four in the afternoon, a dreadful shock of an earthquake was felt here, which lasted about eight seconds; it was more severe than the great one in 1755, but, thank God, not so fatal, a few lives only are lost, but a number of houses damaged."

Another account states that the shock took place about four o'clock in the afternoon, and lasted about twelve seconds. The shock was so severe, that several houses were much damaged, and the city thrown into the greatest confusion. It was not known that any lives were lost, but several had their arms and legs broken, &c. by jumping out at the windows, under the apprehension of the houses falling upon them. The shock was also felt at St. Ubes, Oporto, and generally throughout Portugal. It was felt on board the Lively frigate, then about eighty leagues off the rock of Lisbon.—(PUBLIC PAPERS.)

RESULTS.

Winds Variable.

Mean elevation of barometer	29·89 in.
Mean temperature	59°
Evaporation	4·57 in.
Rain	0·99 in.

Character of the period fair and dry. There has been a remarkable approximation to the mean, both in the extremes of pressure and temperature, and in the daily rate of evaporation. The electricity has been nearly quiescent. Rain by day 0·35, by night 0·58 in.

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* Some notice of the origin of this sweet fluid, which has abounded so as to drop from the trees, of late, may be interesting to most readers. It is well known to naturalists, that it neither falls on the leaves from the air, as it name implies, nor transpires from them; but that it is excerned by insects of the genus *Aphis*, which inhabit the under sides of leaves, and shed this liquor on the surface of those below. This little creature seems to subsist by drawing the juices from the sap vessels, and, by a peculiarity of constitution, rejects the richer saccharine part, which afterwards affords nourishment to many other insects. Ants are so fond of it, that a whole colony may be found travelling to the highest branches of a tree in search of it; and we have seen them seize the clear drop, while yet attached to the body of the Aphis, which, although defenceless, was not molested further by these predacious wanderers.

TABLE IX.

	1807.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
7th Mo.	New M.		July 5	E	29·93	29·87	73°	48°	—	
			6	NE	30·08	29·93	68	43	45	
			7	E	30·19	30·08	63	39	18	
			8	N	30·19	30·16	70	41	20	
		a.	9	Var.	30·16	29·98	77	52	16	
			10	NW	29·98	29·68	81	54	14	
		b.	11	SW	29·72	29·58	78	56	—	1
	1st Q.	*c.*	12	SW	29·78	29·72	79	59	58	1
			13	SW	—	—	—	—	—	—
		d.	14	SW	29·81	29·78	77	58	40	—
		d.	15	SW	29·80	29·78	73	56	14	3
			16	W	29·90	29·80	73	57	12	
			17	W	29·95	29·87	76	60	18	
			18	W	29·99	29·97	76	50	19	
	Full M.		19	SW	—	—	79	60	—	
			20	W	29·81	29·78	80	54	44	
			21	Var.	—	—	79	56	—	
			22	Var.	29·75	29·64	87	62	54	
			23	SW	29·64	29·58	81	62	—	
		d.	24	SW	29·68	29·60	77	57	—	—
			25	SW	29·78	29·69	82	59	—	
			26	SW	29·82	29·70	77	55	82	1
	L. Q.		27	SW	29·91	29·83	76	51	—	
			28	W	29·92	29·78	81	55	—	
			29	SW	29·78	29·58	81	63	—	
			30	SW	29·63	29·58	72	60	90	25
			31	SW	29·66	29·55	71	55	—	
8th Mo.			Aug. 1	S	29·80	29·66	76	47	—	
			2	SW	29·77	29·75	78	55	51	7
					30·19	29·55	87	39	5·90	0·38

NOTES.—*a.* The cockchaffer begins to appear in great numbers. A cat is observed to pursue these insects every evening, feasting on them with avidity.

b. After considerable appearances of a strong electricity in the clouds, which yet did not affect the insulated rod, several *Nimbi* formed suddenly about 5 p. m. from one of which fell a shower in large *warm* drops strongly *positive*. Some thunder and lightning followed, during which the rod was highly charged, but the kinds were not noticed. The wind by the vane continuing strong at E, the lower clouds moved directly N, and the sky cleared over head: but there remained a bank of clouds but little elevated above the N horizon, in which till eleven p.m. were the usual appearances of a thunder storm in action.—(*From MS. Reg.*)

c. Thunder and lightning in the night, with a little rain. An ox was struck dead in the level opposite Woolwich, and found at 5 a.m. the 13th, with the hair singed and the body beginning to putrefy.

d. Slight showers.

RESULTS.

Prevailing Winds West and South-west.

Mean elevation of the barometer	29·81 in.
Mean temperature	66·08°
Rain	0·38 in.
Evaporation	5·90 in.

Rain by night 0·01, by day 0·35 in.

TABLE X.

	1807.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
8th Mo.	New M.	Aug. 3	SW	29·86	29·75	72°	50°	—	
		4	W	29·90	29·86	71	53	—	
		5	SW	29·89	29·78	72	57	—	
		6	SW	29·78	29·75	75	58	98	1
		7	NW	29·82	29·78	71	57	—	
		8	Var.	29·93	29·82	65	55	—	14
		9	NE	29·96	29·93	71	51	13	
	1st Q.	10	NE	29·93	29·88	68	49	—	
	a.	11	SE	29·88	29·64	75	56	38	2
		12	W	29·64	29·62	79	62	—	
	b.	13	SE	29·65	29·50	81	61	—	
	c.	14	NW	29·85	29·50	72	57	—	93
		15	W	30·00	29·85	71	60	—	
	d.	16	NW	30·15	30·08	75	58	74	
		17	E	30·12	30·05	79	54	—	
	Full M. *e.*	18	E	30·05	29·89	79	56	—	
	e.	19	SE	29·89	29·85	79	59	—	
	f.	20	NW	29·85	29·81	75	60	56	1
		21	E	29·80	29·78	78	59	—	
		22	E	29·78	29·76	82	60	—	
		23	SW	29·78	29·75	81	63	55	3
		24	W	29·81	29·76	71	58	—	
		25	W	29·90	99·81	76	56	—	
	L. Q.	26	NW	29·91	29·90	79	51	—	27
		27		29·90	29·61	—	—	47	1
		28	SW	29·83	29·64	79	56	39	
		29	SW	29·86	29·83	74	49	26	
		30	W	29·97	29·86	70	46	19	
		31	NW	30·12	29·97	61	51	5	5
9th Mo.		Sept. 1	W	30·15	30·12	69	45	11	
				30·15	29·50	82	45	4·81	1·47

Notes.—*a.* Rainbow; some lightning in the evening.
b. Much lightning in the night.
c. Very heavy rain a. m.
d. A *Stratus* on the marshes.
e. Foggy morning.
f. Some thunder p. m.; almost constant lightning in the evening.

Accidents by Lightning.

At Stockport, on the 26th, I examined a cotton manufactory, in which a fire had occurred by lightning the night before. It had fallen on the gable end of the building, about seventy feet from the ground, directed apparently to this spot by a packing press, containing much iron-work. In its way it had shivered some slates on the roof, and forced out a quantity of bricks from the wall over a window, which was also shattered. The press was much burned, being apparently set on fire all over by the iron. This effect was most conspicuous in a drawer containing loose iron-work, and some lead, which latter was found to have been melted. The fire having been promptly extinguished, there was little damage, save the loss of some cotton.

The affixing of proper conductors to such manufactories, containing immense quantities of detached iron and brass-work, and crowded with people, cannot be too often recommended, especially such as stand alone and on elevated ground.

I conversed here also with the survivor of two men (George Bradbury and Peter Sidebotham) who were struck, near this spot, about a month before. They had been at work in a garden, and had retired for shelter from a heavy rain to a little summer-house on the bank of the Mersey, which rises here thirty or forty feet from the water. They sat back to back on a chest, with the door shut. Bradbury says he neither *saw*, *heard*, *nor felt* any thing, but on reviving found himself extended on the floor, together with his lifeless companion.

There was in the middle of the roof of this small building a lead gutter, having no metallic communication with the ground, and not more than three or four feet above their heads. A piece of fir, which was laid from wall to wall, about a foot below the gutter, was split by the stroke. The panes of the window were nearly all broken, and the glass thrown *outward*. There was a strong sulphureous smell in the place for some time. It appeared to me that the stroke had passed from the gutter on the body of Sidebotham, and from thence through the thigh of Bradbury, on which the effects yet remained, viz. an ulcer on the outer part a little above the knee, another on the inner, and a third on the calf of the leg, which by bending the knee might be brought into contact with the second. The use of the limb seemed at first to be taken away, but in these parts there presently arose hard swellings which ulcerated.

Bradbury's account of the swiftness of the effect, preventing sensation, is undoubtedly correct; and it is not possible to imagine an easier death, however terrible from its suddenness, than must have befallen his companion.

RESULTS.

Prevailing Winds Westerly.

Mean height of barometer	29·85 in.
Mean temperature	64·96°
Rain	1·47 in.
Evaporation	4·81 in.

Above 1·10 in. of rain appears to have fallen by day, the remainder by day and night.

TABLE XI.

	1807.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
9th Mo.	New M.		Sept. 2	W	30·15	30·07	70°	44°	15	
			3	NW	30·07	29·86	72	49	20	
			4	SW	29·88	29·70	69	59	18	
		d.	5	W	29·70	29·37	72	55	—	
		d.	6	SW	29·62	29·36	62	45	—	
		a.	7	W	29·90	29·62	68	37	91	
	1st Q.		8	W	29·92	29·65	59	45	—	
			9	W	29·83	29·47	66	49	—	
			10	NW	30·03	29·83	55	39	21	65
			11	W	29·90	29·80	58	41	—	
		a.	12	W	29·91	29·79	61	33	31	
		a. b.	13	N	29·98	29·91	54	26	10	
			14	N	29·98	29·92	58	41	12	
			15	NW	29·92	29·92	59	37	9	
	Full M.		16	NW	29·92	29·88	58	38	9	
			17	N	29·88	29·87	57	30	9	
		d.	18	NE	29·85	29·79	54	43	24	
		d.	19	NE	30·16	29·85	61	35	18	
		d.	20	W	30·16	30·01	59	51	—	
		d.	21	SW	30·01	29·72	61	54	25	7
			22	SW	29·72	29·56	60	54	6	24
		d.	23	S	29·56	29·49	61	54	8	10
	L. Q.		24	S	29·52	29·41	66	47	13	
		d.	25	Var.	29·45	29·37	63	46	8	23
		d.	26	SW	29·49	29·45	66	47	—	13
		d.	27	SW	29·46	29·42	66	52	30	5
		d.	28	Var.	29·91	29·46	60	41	11	
			29	E	29·91	29·45	61	45	—	
		e.	30	W	30·16	29·46	59	39	18	
					30·16	29·36	72	26	4·06	1·47

NOTES.—*a.* Hoar frost.

b. This night put a period to the growth of the more tender vegetables, as potatoes, kidney beans, &c. where they lay exposed. The cucumbers were quite killed. This very low temperature (for the season) was confined to a small height, and was detected by exposing the thermometer horizontally four inches above the turf. In its usual position, six feet from the ground, it had not descended on some previous nights to 32°, though spiculæ of ice had been formed on the grass.

c. " From 7 to 8 p. m. I observed a star in the NW, about 25 or 30°

above the horizon, apparently a comet, as it has a luminous brush or tail pointing southward, the extremity being raised above the horizontal line." I owe this observation on the comet, probably one of the earliest made in this part of the kingdom, to my friend and assistant in Meteorological Observations, John Gibson.

d. Strong winds.

RESULTS.

Prevailing Winds Westerly.

Mean height of barometer.............	29·76 in.
Thermometer........................	52·94°
Evaporation........................	4·06 in.
Rain................................	1·47 in.

Of which by day 0·10, by night 0·49, the remainder by day and night.

It is remarkable that the rain of this period agrees exactly in quantity with that of the last. The warm and dry weather terminated, not as usual in thunder showers, but by a sudden and continued depression of temperature; which, with the arid state of the country, constituted a sort of premature winter. The strong southerly winds which blew during the latter half of the period, brought, however, a seasonable supply of moisture, and vegetation has since revived.

It appears by the Register of my friend Thomas Hanson, the results of which appeared monthly in the Athenæum, that there fell in this month at *Manchester* 6¼ in. of rain, the winds having been chiefly W and SW, the mean of barometer 29·62 in. of thermometer 51·73°, the latter probably too high.

TABLE XII.

	1807.		Wind.	Pressure, Max.	Min.	Temp. Max.	Min.	Evap.	Rain, &c.
10th Mo.	New M.	Oct. 1	S	30·16	30·02	60°	36°	18	
	a.	2	W	30·03	29·98	65	51	20	13
	a.	3	SW	30·11	30·03	65	51	11	
	a.	4	S	30·06	30·02	67	48	3	
	a.	5	W	30·02	29·93	65	53	2	1
		6	W	29·96	29·95	61	50	5	
	b.	7		29·95	29·75	65	54	—	
	1st Q.	8	W	30·10	29·75	61	48	45	
		9	W	30·10	30·07	59	52	—	1
		10	SW	30·12	30·07	65	54	14	
		11	SW	30·11	29·98	61	55	—	
		12	W	30·12	29·98	62	56	—	
		13	Var.	30·16	30·12	65	54	26	
	c.	14	SW	30·16	30·01	69	54	10	
	d.	15	SW	30·11	30·01	65	48	9	
	Full M.	16	SW	30·06	29·99	58	52	12	
	e.	17	W	29·99	29·85	63	54	—	
	d.	18	NW	30·24	29·88	62	36	24	
	d.	19	Var.	30·25	29·92	61	43	8	
		20	S	29·92	29·42	65	52	15	
	b.	21	Var.	29·46	29·44	61	53	15	22
	f.	22	NW	29·44	29·03	63	41	4	30
		23	N	29·30	29·20	50	33	5	
	L. Q.	24	SE	29·54	29·30	56	36	5	11
		25	E	29·64	29·54	56	49	9	11
		26	E	29.62	29·48	53	35	—	—
		27	N	29·83	29·62	52	35	6	.24
		28	SW	29·85	29·64	51	38	9	
	f.	29	SW	29·63	29·54	54	34	—	4
		30	W	29·68	29·45	53	39	11	
		31	N	29·91	29·68	48	35	12	
				30·25	29·03	69	33	3·08	1·17

NOTES.—*a.* Calm clear days, with *Gossamer* and *Stratus* by night.
b.b. Windy.
c. The swallows were not seen after this day.
d.d.d. Much dew.
e. A very large and perfect lunar halo.
f.f. Stormy nights.

Additional Notes, &c.—Tenth Mo. 1. This morning's tide (at the Laboratory, Stratford, situate on the River Lea,) was remarkably high, the water rose 18 inches above the usual height of spring tides. The wind yesterday morning was very strong at the W and NW, the barometer rising 7 tenths of an inch in 24 hours. 27. Rainy morning, preceded by a thick fog.

From the Journals of the French National Institution, " M. Messier has collected all the particulars he could of the violent thunder storm that occurred at Paris, on the 21st October, 1807, and the extraordinary gale of wind that came on the next day. In his Journal, which he has kept for 50 years, he finds nothing equal to them: but on the 3d November following, there was a storm as violent, during which the church of Montevilliers was struck by lightning."

Barometer at Paris on the 19th at noon 30·29 inches (English), on the 22d 29·31, on the 23d in the morning 29·12: this was a very wet day there, with the wind strong at S; while with us, *with the same state of the barometer*, it was N and fair. A lower state of both barometer and thermometer ensued, with them as with us, for some time after.

Rain in this month at Manchester, 2·37 in. Mean of barometer 29·65 in.

Hanson.

RESULTS.

Winds Variable.

Mean height of barometer	29·84 in.
Thermometer	53°
Evaporation	3·08 in.
Rain	1·17 in.

Of which there fell by night 0·38 inches, the remainder was not divided.

TABLE XIII.

	1807.	Wind.	Pressure. Max.	Pressure. Min.	Temp. Max.	Temp. Min.	Evap.	Rain, &c.
11th Mo.	Nov. 1		29·90	29·66	55°	43°	—	
	a. 2	SW	29·66	29·20	53	39	—	
	3	SW	29·30	29·21	47	37	36	17
	4	W	29·56	29·30	49	33	17	
	b. 5	SW	29·43	29·31	52	36	7	
	6	W	29·48	29·20	49	41	13	47
	1st Q. 7	SW	29·26	29·14	50	41	9	34
	8		29·35	29·16	46	32	—	
	9		29·47	29·35	44	33	—	
	10		29·40	29·01	47	33	—	
	c. 11	NW	29·81	29·03	42	28	28	61
	c. 12	NW	30·01	29·81	37	29	4	
	13	NW	30·04	29·99	37	31	1	4
	d. 14	N	30·03	29·98	41	30	2	1
	Full M. 15	NE	29·98	29·90	44	35	11	
	16	NE	29·91	29·90	43	39	8	6
	17	Var.	29·90	29·60	43	37	—	
	18	Var.	29·60	29·44	40	30	4	
	e. 19	Var.	29·44	28·69	45	32	—	49
	f. 20	SW	29·32	28·68	41	30	19	
	21	SW	29·54	29·32	37	25	—	
	L. Q. g. 22	E	29·54	29·17	45	30	5	48
	23	S	29·19	29·06	48	31	4	16
	24	SW	29·42	29·19	37	32	—	
	25	W	29·48	29·42	42	29	11	
	26	W	29·61	29·48	38	27	1	
	27	NW	29·82	29·61	33	22	—	
	28	NW	29·82	29·65	31	23	5	
			30·04	29·01	55	22	1·85	2·83

Notes.—*a.* A very stormy night. About 3 a. m. a sudden violent gust, with hail, after which the wind fell.

b. Hoar frost.

c. c. A little snow. The water in the evaporation gauge having been frozen, a small quantity of salt was now introduced to prevent its forming a solid mass.

d. Misty a. m.

e. Snow, in considerable quantity, for the season; which was dissolved by rain in the course of the day.

f. A smart shower of hail, followed by heavy rain, a. m.; fair p. m.; wind very high the whole day.

g. The earth was much hardened this morning by the frost, though the depression of temperature below 32° was not considerable. This is to be ascribed to the previous cooling it received from the melted snow.

RESULTS.

Mean height of barometer	29·47 in.
Temperature	37·92°
Evaporation	1·85 in.
Rain, &c.	2·83 in.

Of which by night 1·59 in. By day 0·16 in.

The barometer has ranged for the most part below the mean, though the middle of the month is distinguished by a pretty bold curve in elevation. The fore part of the period was almost constantly windy; the latter very cold, with hoar frosts; the greatest depression of temperature being after sunrise.

The mean of the barometer at *Manchester* for this month, (of which our period takes in 28 days) is 29·46 inches, the mean temperature 38·20.—*Hanson*. The extremes being 52° and 19°, (each 3° lower than ours), I suspect the mean here stated to be 3° too high, for want of a sufficient proportion of the lowest observations. The *rain*, as before, greatly exceeds ours, being very nearly 5 inches.

TABLE XIV.

	1807.	Wind.	Pressure.		Temp.		Evap.	Rain, &c.
			Max.	Min.	Max.	Min.		
11th Mo.	New M. *a.* Nov. 29	N	29·72	29·65	33°	30°	—	—
	b. 30	N	29·95	29·72	36	30	1	
12th Mo.	Dec. 1	Var.	29·95	29·84	39	32	1	
	c. 2	SW	29·91	29·84	44	29	4	
	3		29·96	29·87	42	32	—	
	c. 4	W	29·87	29·70	47	38	—	
	1st Q. *c.* 5	SW	29·70	29·46	47	35	—	—
	a. 6	W	29·55	29·48	41	27	10	
	d. 7	N	29·59	29·55	35	20	—	
	e. 8	W	29·76	29·50	33	19	8	16
	9	NW	30·01	21·76	34	21	—	
	b. 10	NW	30·01	30·00	32	17	4	
	f. b. 11	NW	30·20	30·01	38	32	—	
	b. 12	W	30·25	30·20	44	31	—	—
	Full M. *b.* 13	W	30·24	30·13	43	36	6	
	g. 14	Var.	30·20	30·16	44	29	2	
	b. 15	W	30·16	30·06	43	34	2	
	16	Var.	30·07	30·06	37	30	0	
	b. 17	E	30·06	30·02	36	32	—	
	b. 18	E	30·09	30·00	37	33	3	
	b. 19	SE	30·30	30·09	39	28	0	
	b. 20	Var.	30·41	30·30	31	28	0	
	b. 21	NW	30·40	30·29	30	26	0	
	L. Q. *h.* 22	W	30·29	30·20	36	28	0	
	b. 23	SW	30·20	30·18	36	31	—	
	24	SW	30·18	30·12	39	35	4	3
	25	SW	30·12	29·93	48	39	4	
	c. 26	SW	29·93	29·72	54	45	—	
	27	SW	29·95	29·71	46	33	10	2
	i. 28	SW	29·71	29·55	48	43	9	
			30·41	29·46	54	17	0·68	0·21

NOTES.—*a.* Snow at intervals.

b. Misty.

c. Windy.

d. a. m. hoar frost. p. m. large lunar halo.

e. A fall of snow, unusually deep for this part of the island: during it the thermometer was three times noted in gradual ascent, *viz.* at 10 a. m. 19°; at 3 p. m. 22°; at 9 p. m. 26°: it amounted on the plain to about 6 inches: to the small depth which it exhibits in the rain-gauge should be added near as much more, for loss by evaporation, and spilling, before the column was melted down into the funnel.

f. A little snow very early, followed by a thaw and cloudy weather.

Notes, &c. *(continued)*.

g. Hoar frost, which speedily went off: clear morning.

h. The melting rime fell in showers from the trees, and the air cleared up.

i. The clouds highly coloured at sunrise, indicating wind; the evening proved stormy.

METEOROLITES IN NORTH AMERICA.

Greenfield, Massachusetts, December 19, 1807.—On Monday morning last, the 14th inst. in the vicinity of this place, several bodies of stone were discovered, which appear to have descended from the regions above.—Several pieces of this stone were shown me by different persons, by whom the fact was so well attested as to make it impossible altogether to disbelieve it. But being resolved to get the best evidence of such an extraordinary occurrence, which the nature of the case could admit, I devoted this day, in company with the Rev. Mr. Holly, in visiting the different places where the stones had fallen.

The first place we visited is about three miles and a half in a north-easterly direction from my house, in a lot firmly covered with grass, about 25 rods from the house of Elijah Seeley. The breach here made in the ground was about four feet diameter, and nearly the same depth, in a rather sloping direction, which was occasioned by the stone striking a shelly rock and glancing. The rock on which the stone fell was much shattered, and the stone itself very much broken, the largest pieces weighing not more than six or eight pounds; the quantity altogether about a bushel. A quart or two of these fragments we gathered here; the greater part having been previously carried away by the inhabitants. By the fall and glancing of the stone, the dirt and sod were strewed two or three rods round the breach, and several pieces of sod carried before the fragments to the lowest depth to which they sunk into the earth, and were removed by myself. Mr. Seeley and his wife say that just after day-light, they saw vivid flashes of light in rapid succession for five or six seconds; and in about a minute afterwards it was followed with a dreadful explosion resembling three cannons fired in quick succession, ending in a cracking rumbling noise; that about ten o'clock the same morning, going into this lot, he discovered the breach in the ground above described, and conceiving it to have been caused by something discharged from above, at the time he heard the explosion, he called his wife out to witness the facts; and in the course of the day it was visited by all the neighbourhood. Mr. Seeley and his wife are sober, discreet, and intelligent persons, implicitly to be relied on.

The next place we went to view was about four miles NE from the first, in the court yard of Mr. William Prince, a respectable and wealthy farmer. The court yard is a grass plot, smooth as a carpet, and firmly trodden. Here we found a hole, about the size of a post hole, two feet two inches in depth, from which had been taken, on the evening of the aforesaid Monday, a stone weighing thirty-five pounds, the texture and appearance of which resembled exactly the one which fell at Seeley's. Mr. Prince and his wife and sons (men grown) give the same account of the flashes and explosion as was given above, with this farther particular, that they heard, about a minute after the explosion, the fall of the stone, at the noise of which they were much alarmed, but could not discover the cause. After it was light Mr. Prince went out, and passing across the door yard discovered a hole in the grass plot, only twenty-seven feet from his house. The ground appeared fresh broken, and no dirt thrown out. He looked into it, but could see nothing, and no further discovery was made until evening, when his sons returned from a town meeting at Weston, where they heard of the fall of the stone at Seeley's. This induced them to examine further the hole in the court yard. On hauling out the dirt which lay loosely over the stone, they soon discovered it, and took it out entire, except some small pieces, that were broken off by stones in the ground. We examined this hole, and found the sod and grass as in the other case, driven before the stone to the bottom of the hole, which we took up, with pieces of the stone that had not before been found. The hole was perpendicular in the earth, and in diameter no larger than the stone. A Mr. David Hubbell, a man of undoubted veracity, was passing in the street about 25 rods from this stone when it fell, who saw a ball of fire, emitting sparks, with a tail about four feet long, shoot across the horizon in a southerly direction, and in about a minute or two afterwards he heard the explosion, which he described as the others had done; and a minute or two after that, he heard a loud whistling through the air, which made a noise like a hurricane. The same appearance and explosions were witnessed by Judge Wheeler and Russel Tomlinson, who were ten miles distant from each other; men of great candour and careful observation; but being distant from the places where these stones fell, neither of them heard the whistling just mentioned. The largest piece of the stone taken out of Prince's yard, which remains entire, weighs about eleven pounds, and is now in my possession; the rest of it has been broken into small parts and scattered amongst the inhabitants.

The third and last place where these stones have been discovered to have fallen, is about five miles north-east of Mr. Prince's, and seven below Newtown, near the turnpike road which leads from thence to Bridgeport.

The stone which fell there was small, and falling upon the top of a rock, that projected two feet above the ground, was dashed into small fragments, none of which weighed more than four or five ounces; and it was judged the whole of these collected would not more than have filled a quart measure.—This stone fell about thirty yards from the house of Mr. Merwin Burr; he and his wife being up, they both ran to the door the moment they discovered the flashes of light, and in a minute or two heard the same explosion as heretofore described; and in about a minute after the explosion they heard something fall near by them which made quite a loud report; and in quick succession three or four other noises at greater distance, which they thought to be something falling in a swamp, 20 or 30 rods in front of the house. Mr. Burr took a candle, and with his wife went out immediately, to see if they could find any thing in the direction where they heard the loudest report, but found nothing; when it grew lighter, and before sunrise, Mr. Burr went again, and found the fragments of the stone which had been dashed to pieces on the rock, and which have precisely the same appearance as those found at the two former places; the swamp, being full of water, has not been explored. Besides the large piece, I have many smaller ones collected at these three different places by Mr. Holly and myself, exactly resembling each other; and from the mouths of all these witnesses I have named (except Mr. Burr, who happened to be from home) we have taken the facts just as I have here related them. The ball of fire and explosion were witnessed by hundreds in this and the neighbouring towns; and I myself, as I was returning from New-York in the stage, a little on this side of Rye, at the same hour in the morning, saw vivid flashes of light, which lasted four or five seconds of time; and though the curtains were down, the stage was perfectly illuminated, but we heard no report.

This stone, I presume, possesses considerable iron, as it is strongly attracted by the needle; and I judge it is one fourth heavier than the common granite. The outside is covered with a smooth, glazed, sooty crust, as thick as foolscap, looking like the back of a chimney; and the broken surfaces are of a bluish lead colour, the whole appearing to have undergone the action of intense heat.—The body of stone which fell at Seeley's must have weighed more than one hundred pounds.—*J. Bronson.*

Other accounts are given of the storm, and of the meteor here noticed, in communications from other parts of the country; they are however too much alike to be inserted here.—(Athenæum.)

NOTES, &c. (*continued*).

RESULTS.

Prevailing Winds Westerly.

Mean height of barometer	29·80 in.
Thermometer	36·26°
Evaporation	0·68 in.
Snow and rain	0·21 in.

Character of this period frosty, and, for the most part, calm; the atmosphere turbid and almost constantly depositing moisture.

At *Manchester*, there fell in this month 2·62 inches of rain, the mean of the barometer being 29·65 inches.—*Hanson.*

Extracts from a Paper by M. Cotte, in the Journal de Physique, tom. lxviii. p. 331, *&c. inserted for the purpose of comparison with the corresponding dates in this Register.*

1807.—*Feb.* 18. A dreadful gale with much snow on the French coast of the channel, in Flanders, Picardy, and Normandy; at Montmorency, near Paris, stormy, with snow and hail, the barometer exhibiting great variation. *March* 8. Barometer very low at Montmorency, a violent storm of wind at Mende, (in the S of France), and on *March* 30, an earthquake in the department of Puy-de-Dôme. *April* 13. Much damage by hail, (grêle desastreux) with thunder, in the Haute Garonne, S of France. Barometer low at Montmorency. Frost and snow in this month so far south as Naples, after which in France, as here, there followed excessive heat about the close of the month. *May* 26. Great hail at Tonneins. 29. Hurricane about Dijon, and in the departments to the NE: no wind near Paris, but the barometer low. *June* 6. Earthquake at Lisbon. 17. Thunder storm with very large hail at Antwerp. *July, August*. An extremely hot and dry season in France. *Sept.* 4, 5. Earthquake at Genoa and Naples. 7, 30. Violent storms of wind at the Hague: much wind at Paris. *Oct.* 1. An earthquake, with a storm of wind and thunder at Vienna, the barometer very low. Barometer high at Paris, with calm weather. *Nov.* 3. A great storm of wind and thunder at Montivillois, Lower Seine. 23. A furious hurricane with much rain at Bordeaux: for a week before and after which, there were frequent shocks of an earthquake at Algiers. Barometer low during this time at Paris.

TABLE XV.

	1807.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
12th Mo.	New M. *a.* Dec.	29	SW	29·56	29·37	53°	38°	—	—
	a.	30	SW	29·37	29·32	48	35	16	
1808.	*a.*	31	SW	29·32	29·24	46	42	—	
1ts Mo.	Jan.	1	S	29·24	28·93	47	39	22	28
		2	SW	29·23	28·96	44	31	4	37
	b.	3	SW	29·95	28·96	39	31	—	
	c. b.	4	SW	29·95	29·82	45	32	5	4
	1st Q.	5	SW	30·22	29·95	48	39	—	
	b.	6	SW	30·42	30·22	47	39	—	
		7	SW	30·50	30·42	47	41	8	3
		8	SW	30·51	30·50	44	38.	—	—
	f.	9	SW	30·50	30·41	45	38	—	
		10	SW	30·41	29·97	48	42	—	
	b.	11	NW	29·98	29·95	48	32	—	
	b.	12	NW	29.95	29·81	37	31	—	
	Full M. *d.*	13	W	29·81	29·21	45	37	16	
	a.	14	SW	29·98	29·16	46	29	7	2
	b.	15	NW	30·16	29·98	33	23	—	
		16	NW	30·36	30·16	31	23	—	
		17	NE	30·51	30·36	34	21	—	
		18	N	30·51	30·26	35	24	—	
		19	SW	30·26	29·66	40	34	13	2
	L. Q. *e.*	20	NW	29·82	29·66	40	20	—	
	e.	21	NW	30·19	29·82	27	12	—	
	g.	22	SW	30·19	30·05	31	14	—	—
		23	SW	30·05	29·87	38	30	9	1
	f.	24	Var.	29·87	29·45	37	31	—	
	f.	25	Var.	29·45	29·25	34	24	—	
	g. b.	26	NW	29·51	29·25	33	24	5	
	g. a.	27	SW	29·37	29·25	46	27	—	—
	h.	28		29·51	29·25	43	33	8	22
				30·51	28·93	53	12	1·13	0·99

NOTES.—*a.* Strong winds: the night of 31 stormy, and that of 14 tempestuous.

b. Fine clear days.

c. a. m. (and 26th after sunset) a little opake hail.

d. *Cirrostratus* highly coloured at sunset.

e. Snow at different times.

f. Misty weather.

g. Hoar frost.

h. A smart shower mixed with hail at night.

NOTES, &c. *(continued).*

On the 23d, at 10 a.m. a faint but nearly perfect rainbow appeared under singular circumstances. The night had been clear and frosty, and at this time a few light clouds had began to appear in different quarters, but none over the place of the bow, nor was the falling mist that afforded it of sufficient density to obscure the sky. Precipitation after this went on rapidly; in 30 or forty minutes the sky was overcast, and before noon it rained a little. On the 26th, in the midst of calm sunshine, wind NW, a patch of *Cirrostratus*, in the form of a *cyma recta*. The wind changed to SW, and blew pretty strong on the 27th, with rain.

Additional Notes, &c.—First Mo. 6. The morning was beautifully clear, with *Cirrocumulus* and *Cirrostratus*, stretching from N to S. 14. The day was very stormy: all night the wind blew quite a tempest, the barometer rising rapidly. The weather appears to have been equally tempestuous this day at Plymouth. 23. After a little rain, a rapid thaw, continuing through the following day.

RESULTS.

Prevailing Winds Westerly and chiefly South-west.

Mean elevation of barometer	29·82 in.
Thermometer	36·98°
Evaporation	1·13 in.
Snow and rain	0·99 in.

Of which by day 0·59, by night 0·28 in.

TABLE XVI.

	1808.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
1st Mo.	New M.	*a.*	Jan. 29		29·70	29·51	42°	37°	—	
			30	S	29·74	29·62	50	40	12	9
			31	SW	29·83	29·74	51	41	—	
2d Mo.		*a.*	Feb. 1		29·81	29·63	52	47	19	2
		b.	2		29·74	29·56	51	37	—	—
		c.	3		30·25	29·74	43	30	13	1
		d.	4	W	30·31	30·17	42	30	10	
	1st Q.	*e.*	5	SW	30·17	29·94	49	35	5	
		e.	6	W	29·94	29·79	50	44	14	3
		f.	7	W	29·86	29·79	48	37	8	28
			8	W	29·79	29·74	39	29	—	—
			9	NW	29·99	29·79	38	27	—	
			10	NW	30·10	29·95	34	25	—	
		g.	11	SW	29·95	29·20	47	29	—	—
		h.	12	Var.	29·69	29·24	31	23	—	—
	Full M.		13	N	30·01	29·69	30	19	—	
		i.	14	N	30·18	30·01	29	17	—	
		g.	15	SW	30·01	29·89	37	23	21	29
			16	NW	30·02	29·89	39	26	—	
			17	W	30·02	29·99	41	30	5	
			18	NW	30·22	30·02	43	30	4	
		k.	19	NE	30·49	30·22	42	26	—	
	L. Q.	*k. l.*	20	E	30·53	30·49	39	24	—	
		k.	21	NE	30·53	30·50	39	29	—	
		k.	22	NE	30·50	30·45	40	32	—	
			23	NE	30·45	30·40	38	32	32	1
			24	NE	30·71	30·45	39	28	—	
			25	E	30·71	30·61	37	24	20	
					30·71	29·20	52	17	1·63	0·73

NOTES.—*a.* At 7 h. 20 m. p.m. a brilliant meteor in the east. It was a small bright blue mass of light, with a short red train. It appeared suddenly, at a moderate elevation, and after descending a few degrees, with a small tendency northward, became extinct.

b. a. m. stormy with rain.

c. The skylark sings. About noon a warm electrical shower, giving plenty of small sparks from the rod.

d. Hoar frost, a. m. Electric signs again, from a *Nimbus* passing in the south. The blackbird sings. A small bright lunar halo.

e. e. Strong winds.

f. Lunar halo, consisting of a coloured circle near the moon, and a pale one much more distant.

g. Snow at intervals.

h. The wind, which was full south in the night with rain, blew furiously from the north all day, with a continued fall of snow as fine as dust, which was at length drifted to the depth, in some places, of three or four feet.

i. The sky this evening being uncommonly serene, I suspected a strong evaporation of the snow to be going on. A Six's thermometer was therefore placed horizontally upon it, in a place exposed to the wind. It descended to 6·5°, or 10·5° lower than the standard instrument at five feet elevation. The morning of 15th was cloudy, with rime on the trees.

k. Hoar frost.

l. The clouds beautifully coloured at sunset.

Additional Notes, &c.—Second Mo. 3. The clouds to-day and yesterday, in the intervals of the showers, assumed the bold and compound structure usual in summer.

RESULTS.

Winds Westerly to the last quarter—afterwards Easterly.

Mean height of barometer..............	30·02 in.
Temperature	35·91°
Evaporation	1·63 in.
Rain and snow	0·73 in.

Character of this period, variable and frosty.

Rain by night 0·28: remainder by day and night.

" *Manchester*. On Thursday the 11th Feb. it was remarkable tempestuous, particularly in the evening, with a great fall of snow, which was much drifted. The temperature was under the freezing point; and the barometer, during the day, fell four-tenths of an inch. On the 21st, about seven o'clock in the evening, a luminous body was seen descending in a SW direction.—*Hanson*."

TABLE XVII.

	1808.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
2d Mo.	New M.		Feb. 26	Var.	30·61	30·43	39°	30°	9	
			27	W	30·43	30·41	48	33	6	
			28	NW	30·41	30·14	50	39	—	
			29	NW	30·31	30·14	51	43	9	4
3d Mo.			March 1	NW	30·36	30·31	52	45	4	
			2	NW	30·35	30·35	51	42	6	
			3	NW	30·43	30·34	48	30	5	
		a.	4	E	30·46	30·43	54	35	7	
	1st Q.	*b.*	5	E	30·46	30·46	46	30	11	
		b.	6	NE	30·46	30·37	46	31	19	
			7	NE	30·37	30·33	42	32	22	
			8	NE	30·36	30·31	41	31	14	
		c.	9	E	30·36	30·35	43	32	11	1
		c.	10	E	30·42	30·36	40	30	17	
		c.	11	NE	30·40	30·32	40	32	13	
	Full M.		12	NE	30·32	30·22	40	35	5	
		e.	13	E	30·22	30·14	43	35	11	
		d.	14	NE	30·14	30·02	42	34	13	
			15	NE	30·02	30·00	45	32	13	
		b.	16	NE	30·02	30·02	44	27	—	
		d.	17	NE	30·02	30·00	37	28	—	
		d.	18	NE	30·00	29·79	35	29	—	
	L. Q.	*d.*	19	SE	29·79	29·55	42	32	36	7
		f.	20	E	29·55	29·70	45	37	0	7
		f.	21	NE	29·90	29·70	41	36	6	
			22	NE	29·96	29·90	43	28	13	
		b.	23	NE	29·93	29·93	41	31	15	
		g.	24	E	29·95	29·91	39	18	—	6
			25	NE	29·95	29·92	43	23	12	
					30·61	29·55	52	18	2·77	0·25

NOTES.—*a.* Very misty a. m. with hoar frost. Wind W.

b. Hoar frost.

c. Lunar halo.

d. Snow in small quantities.

e. A little rain a. m. At 2 p. m. a slight shower of hail.

f. Misty a. m.

g. A smart shower of snow, covering the ground in a few minutes.

RESULTS.

Prevailing Winds Easterly.

Mean height of barometer	30·16 in.
Temperature	38·11°
Evaporation	2·77 in.
Rain and snow	0·25 in.

The atmosphere during this period has preserved, with remarkable uniformity, the character peculiar to the season; dry, dense, and clear below, though mostly cloudy above. From the rules laid down by Kirwan, the probability seems to be as five to one in favour of a dry summer. Rain noted by day 0·04, by night 0·08 in.

The rules above alluded to are stated to have been deduced from a series of observations made from 1677 to 1789, and are as follows:

1. When there has been *no storm* before or after the vernal equinox, the ensuing summer is generally *dry*, at least five times in six.

2. When a storm happens from an easterly point on the 19th, 20th, or 21st of March, the succeeding summer is *dry*, four times in five.

3. When a storm arises on the 25th, 26th, or 27th of March, and not before, in any point, the succeeding summer is generally *dry*, four times in five.

4. If there should be a storm at SW, or WSW, on the 19th, 20th, or 22d of March, the succeeding summer is generally *wet*, five times in six.

" *Dry* summers (this philosopher states) are the consequence of *uniform* winds, from whatever quarter they may blow; as *wet* summers are of their *variation*, particular if in opposite directions." Again, " Southerly winds are most frequently accompanied with rain in most parts of Europe at least, and probably in most parts of our hemisphere; but northerly and easterly, with clear, dry, and serene weather." And it seems reasonable to suppose that the wind which is to prevail during the summer, may most frequently set in with the vernal equinox.

TABLE XVIII.

	1808.	Wind.	Pressure.		Temp.		Evap.	Rain, &c.
			Max.	Min.	Max.	Min.		
3d Mo.	*a.* March 26	NE	30·05	29·95	47°	34°	6	
	New M. 27	NE	30·06	30·05	38	32	—	
	28	NE	30·14	30·06	40	27	—	
	29	NE	30·12	30·05	45	28	—	
	30	NE	30·05	29·98	39	32	—	
	31	N	29·98	29·78	41	25	64	
4th Mo.	April 1	NW	29·84	29·67	41	22	—	
	2	NW	29·91	29·84	42	27	—	
	b. 3	SW	29·91	29·72	51	37	34	
	1st Q. *c.* 4	SW	29·72	29·37	53	44	13	6
	c. 5	SW	29·58	29·26	53	48	—	—
	e. 6	SW	29·79	29·58	54	50	27	7
	c. 7	SW	29·80	29·63	56	38	8	1
	d. 8	NW	30·24	29·80	52	33	9	6
	9	NW	30·24	30·24	51	38	9	
	Full M. *c.* 10	N	30·24	30·24	55	45	10	
	c. 11	W	30·24	30·05	54	42	12	—
	c. 12	NW	30·05	30·29	51	36	8	2
	e. 13	NW	30·29	30·19	60	39	—	
	e. 14	W	30·19	30·05	66	39	30	
	15	N	30·06	30·00	63	31	17	
	f. 16	Var.	30·13	30·06	52	30	12	
	L. Q. 17	Var.	30·11	30·04	49	29	12	1
	g. 18	Var.	30·04	29·61	46	32	11	
	c. h. 19	Var.	29·62	29·57	46	25	17	2
	c. 20	SW	29·57	29·14	49	36	—	59
	21	SW	29·44	29·09	47	34	20	
	c. 22	W	29·41	29·40	54	36	14	7
	23	Var.	29·58	29·41	48	35	5	11
	24	N	29·87	29·58	47	33	8	7
			30·24	29·09	66	22	3·46	1·09

NOTES.—*a.* Snow.

b. The atmosphere, which has been long serene, begins to grow turbid.

c. Windy, sometimes amounting to a gale.

d. A shower at sunset, with *negative* electricity.

e. Misty morning.

f. The swallows made their first appearance this morning.

g. a. m. a strong *positive* electricity in the clear atmosphere.

h. p. m. much snow, which gave *positive* signs till nearly over, and then *negative*. The rain from the 17th to the end was always found electrified variably, often so as to afford moderate sparks. All the showers were mixed with hail. On the 23d, p. m. after a sudden jet of fire from the insulated to the uninsulated part of the conductor, there followed thunder pretty far to the east and south-east. The cuckow had been heard this morning.

Additional Notes, &c.—Fourth Mo. 15. *Cirrostratus* in large patches, which came down towards evening with an appearance as for thunder, the air being somewhat electric. 19. The flakes of snow this afternoon were unusually large. 20. Heavy rain in the evening.

RESULTS.

Wind and Character Variable. Hoar Frost has been frequent.

Mean height of barometer	29·86 in.
Temperature	41·82°
Evaporation (in 29 days)	3·40 in.
Rain, &c.	1·09 in.

Rain noted as fallen by day 0·20, by night 0·72 in.

TABLE XIX.

	1808.	Wind.	Pressure.		Temp.		Evap.	Rain, &c.
			Max.	Min.	Max.	Min.		
4th Mo.	New M. *a*. April 25	NW	29·91	29·87	43°	33°	5	6
	26	N	29·91	29·90	47	34	8	41
	27	N	29·90	29·87	42	36	6	
	28	N	29·90	29·87	46	35	9	
	29	W	29·90	29·88	45	32	10	
	30	Var.	29·95	29·90	52	39	8	
5th Mo.	*b*. May 1	Var.	29·93	29·91	65	38	13	
	c. 2	E	29·91	29·81	66	50	32	
	1st Q. 3	E	29·81	29·77	79	45	28	
	d. 4	NE	29·80	29·77	80	44	30	
	e. *d*. 5	Var.	29·77	29·75	72	53	37	
	f. *e*. *d*. 6	S	29·75	29·59	78	52	21	
	g. 7	SE	29·59	29·52	75	51	24	3
	h. 8	Var.	29·54	29·52	63	45	11	7
	9	SW	29·77	29·52	57	44	10	12
	Full M. 10	SW	29·90	29·71	62	48	16	2
	i. 11	SW	30·13	29·90	64	46	12	3
	12	SW	30·24	30·13	64	53	12	
	k. 13	SW	30·24	30·15	73	55	18	
	14	W	30·15	30·11	78	54	21	
	15	S	30·11	29·95	83	60	33	
	16	SW	30·01	29·95	79	55	33	
	L. Q. 17	Var.	30·04	29·98	80	51	22	
	18	NE	30·21	30·04	61	37	—	
	19	NE	30·21	30·02	63	38	24	
	20	Var.	30·02	29·77	66	52	—	—
	21	N	29·97	29·58	66	50	27	40
	22		29·62	29·54	69	51	10	30
	23		29·80	29·62	66	46	10	11
			30·24	29·52	83	32	4·90	1·55

NOTES.—*a*. The nightingale sings.

b. *Negative* electricity pretty strong the whole day.

c. Lightning about sunset.

d. Much dew.

e. Lunar halo.

f. The evening twilight at nine was brilliant in the highest degree, casting a strong shadow into the light of the moon, though the latter was near the meridian.

g. a. m. rainbow, with little appearance of cloud. About 5 p. m. wind E, heavy showers with lightning to the west, and the bow again twice. Sparks of *negative* electricity from the extremity of one shower. After this, from 8 to 10 p.m. wind SE. A thunder storm passed in the E from S to N. Three distinct *Nimbi* were perceptible on the horizon, illuminated by continual discharges, the sound of which did not reach us: (nor did their electricity in the least affect the insulated conductor.—*From MS. Reg.*)

h. At 8. a.m. a steady rain, non-electric: then showers, with a changeable electricity. The master of a small vessel, whom I met with on the 9th, informed me that, being in the Channel, about 90 miles E of my residence, he had the above storm for several hours as far to the *west* of him. He also was nearly out of hearing of the thunder, but had a dry squall at 9 p.m. so violent as to oblige him to strike all his canvas. This storm, therefore, though it extended far to the north, passed us in a column not exceeding 30 or 40 miles in width, following the coast and the hills.

i. Squalls with rain: a fine bow p.m.

k. Hazy atmosphere, with abundance of the *Cirrostratus*.

Additional Notes, &c.—Fifth Mo. 1. The pith-balls of the insulated conductor diverged one-eighth of an inch all day: there were few clouds, chiefly nascent *Cumuli*. 2. A smart breeze and clear sky till afternoon, when a very few drops fell. 5. The wind veered from E by S. 8. The last shower gave sparks *negative*, the charge continuing for some time after it: at length after a sudden *positive* charge the air began to clear. 11. One of these *Nimbi* gave during its approach first a weak *positive*, then a strong *negative* charge: the rain, when it came, was first weakly *positive*, then non-electric: the weight of it fell to the NE of us. 14. a.m. *Cirrocumulus*.

The following account of a new Volcano in one of the Azores has lately been given to the public by the American Consul at St. Antonio.

Fayal, (Azores) June 25, 1808.

" A phenomenon has occurred here not unusual in former ages, but of which there has been no example of late years; it was well calculated to inspire terror, and has been attended with the destruction of lives and property. On Sunday, the 1st of May, at one p.m. walking in the balcony of my house at St. Antonio, I heard noises like the report of heavy cannon at a distance, and concluded there was some sea engagement in the vicinity of the island. But soon after, casting my eyes towards the island of St. George, ten leagues distant, I perceived a dense column of smoke rising to an immense height; it was soon judged that a volcano had burst out about the centre of that island, and this was rendered certain when night came on, the fire exhibiting an awful appearance. Being desirous of viewing this wonderful exertion of nature, I embarked on the 3d of May, accompanied by the British Consul, and ten other gentlemen, for St. George; we ran over in five hours, and arrived at Vellas, the principal town, at eleven a.m. We found the poor inhabitants perfectly panic struck, and wholly given up to religious ceremonies and devotion. We learned that the fire of the first of May had broken out in a ditch, in the midst of fertile pastures, three leagues SE of Vellas, and had immediately formed a crater, in size about twenty-four acres. In two days it had thrown out cinders or small pumice stones, that a strong NE wind had propelled southerly; and which, independent of the mass accumulated round the crater, had covered the earth from one foot to four feet in depth, half a league in width, and three leagues in length; then, passing the channel five leagues, had done some injury to the east point of Pico. The fire of this large crater had nearly subsided, but in the evening preceding our arrival, another small crater had opened, one league north of the large one, and only two leagues from Vellas. After taking some refreshment, we visited the second crater, the sulphureous smoke of which, driven southerly, rendered it impracticable to attempt approaching the large one. When we came within a mile of the crater, we found the earth rent in every direction, and, as we approached nearer, some of the chasms were six feet wide; by leaping over some of these chasms, and making windings to avoid the larger ones, we at length arrived within two hundred yards of the spot; and saw it, in the middle of a pasture, distinctly at intervals, when the thick smoke which swept the earth lighted up a little. The mouth of it was only about fifty yards in circumference; the fire seemed struggling for vent; the force with which a pale blue flame issued forth resembled a powerful steam-engine, multiplied a hundred fold; the noise was deafening; the earth where we stood had a tremulous motion, the whole island seemed convulsed, horrid bellowings were occasionally heard from the bowels of the earth, and earthquakes were frequent. After remaining here about ten minutes we returned to town; the inhabitants had mostly quitted their houses, and remained in the open air, or under tents. We passed the night at Vellas, and the next morning went by water to Ursulina, a small sea-port town, two leagues south of Vellas, and viewed that part of the country covered with the cinders before-mentioned, and which have turned the most valuable vineyards in the island into a frightful desert. On the same day (the 4th of May) we returned to Fayal, and on the 5th and succeeding days, from twelve to fifteen small volcanos broke out in the fields we had traversed on the 3d, from the chasms before described, and threw out a quantity of lava, which travelled on slowly towards Vellas. The fire of those small craters subsided, and the lava ceased running about the 11th of May; on which day the large volcano, that had laid dormant for nine days, burst forth again like a roaring lion, with horrid belchings, distinctly heard at twelve leagues distance, throwing up prodigious large stones and an immense quantity of lava, illuminating at night the whole island. This continued with tremendous force until the 5th of June, exhibiting the awful yet magnificent spectacle of a perfect river of fire (distinctly seen from Fayal!) running into the sea. On that day (the 5th) we experienced that its force began to fail, and in a few days after it ceased entirely. The distance of the crater from the sea is about four miles, and its elevation about 3,500 feet. The lava inundated and swept away the town of Ursulina, and country-houses and cottages adjacent, as well as the farm-houses, throughout its course. It, as usual, gave timely notice of

NOTES, &c. *(continued)*.

its approach, and most of the inhabitants fled; some few, however, remained in the vicinity of it too long, endeavouring to save their furniture and effects, and were scalded by flashes of steam, which, without injuring their clothes, took off not only their skin but their flesh. About sixty persons were thus miserably scalded, some of whom died on the spot, or in a few days after. Numbers of cattle shared the same fate. The Judge and principal inhabitants left the island very early. The consternation and anxiety were for some days so great among the people, that even their domestic concerns were abandoned, and, amidst plenty, they were in danger of starving. Supplies of ready-baked bread were sent from hence to their relief, and large boats were sent to bring away the inhabitants, who had lost their dwellings. In short, the island, heretofore rich in cattle, corn, and wine, is nearly ruined, and a scene of greater desolation and distress has seldom been witnessed in any country."—(ATHENÆUM).

RESULTS.

Winds Variable.

Mean height of barometer	29·87 in.
Temperature	55·18°
Evaporation	4·90 in.
Rain, &c.	1·55 in.

The current month has been highly favourable to vegetation, which had been long retarded by the low temperature. Rain noted by day 0·52, by night 0·07 in.

TABLE XX.

	1808.				Wind.	Pressure.		Temp.		Evap.	Rain, &c.
						Max.	Min.	Max.	Min.		
5th Mo.			May	24		29·90	29·80	66°	49°	—	
	New M.			25		29·88	29·70	77	56	—	
				26		29·70	29·65	65	52	—	—
		a.		27	SW	29·94	29·70	63	47	38	20
				28	SW	30·15	29·94	68	44	16	
		b.		29	SW	30·17	30·15	68	59	9	
				30	SW	30·15	29·97	76	52	16	12
				31	Var.	29·97	29·78	87	59	16	
6th Mo.	1st Q.		June	1	SW	29·99	29·79	63	44	8	3
				2	SW	29·98	29·88	70	47	20	
				3	Var.	29·88	29·68	65	47	—	3
				4	Var.	29·68	29·65	71	49	33	
				5	Var.	29·68	29·65	66	44	15	
				6	W	29·80	29·68	58	46	—	
				7	W	29·82	29·77	68	48	17	
	Full M.			8	W	29·77	29·65	65	51	16	2
				9		29·80	29·64	58	48	—	—
				10	NW	30·01	29·80	63	47	15	4
		c.		11	N	30·15	30·00	72	47	14	24
		d.		12	Var.	30·15	30·11	70	45	8	
		d.		13	SW	30·12	30·02	70	49	11	
				14		30·02	29·85	70	54	19	2
	L. Q.			15	NW	30·07	29·85	65	44	12	
		e.		16	NW	30·10	30·07	65	54	12	
				17	W	30·07	30·00	66	58	16	
				18	W	30·04	30·00	76	54	10	
				19	NW	30·04	30·00	76	54	11	
				20	Var.	30·00	29·95	72	56	14	
				21	E	29·95	29·78	71	56	14	
				22	SW	29·78	29·69	68	54	13	39
		f.		23	Var.	29·83	29·70	68	44	17	
						30·17	29·64	87	44	3·90	1·09

NOTES.—*a.* Windy.

b. Much dew.

c. p. m. thunder in the NW.

d. Hazy atmosphere a. m.

e. No dew this morning.

f. The cuckow has not yet left us: the nightingale is still heard, but less constantly. An extensive *Stratus* on the meadows this evening.

Additional Notes, &c.—The *Cirrostratus* in parallel waved bars made its appearance on the 26th of Fifth month: which day in other respects (a somewhat low barometer excepted) indicated nothing against fair weather: on the 10th of Sixth month, the same prognostic was observed, with the barometer several tenths higher. In each case rain followed in some quantity. The rain on the 22d was preceded by a regular gradation of clouds, during twenty-four hours, from the *Cirrus* to a completely full sky; and it was followed by the *Stratus*. 23. a. m. *Cumulus* with *Cirrus*; the lower air remarkably clear.

Of the rain in this period 0·12 in. is noted as having fallen by night.

RESULTS.

Prevailing Winds Westerly.

Mean height of barometer.............	29·89 in.
Thermometer.........................	59·41°
Evaporation.........................	3·90 in.
Rain, &c............................	1·09 in.

This spring, though very late in its commencement, is remarkable for having proceeded through a period of more than seven weeks without a single frosty night, at a season when they are almost always experienced. Fruit of almost every kind has consequently succeeded well; apples in particular, which seldom amount to a crop in these parts, promise to be abundant.

TABLE XXI.

	1808.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
6th Mo.	New M.	June 24	Var.	29·98	29·83	74°	48°	15	
		25	NE	30·03	29·98	75	47	11	6
		26	E	30·04	30·03	75	54	17	
		27	N	30·08	30·04	67	52	—	
		28	NE	30·13	30·05	61	52	23	
		29	NE	30·24	30·11	75	50	20	
		30	NE	30·24	30·15	70	49	18	
7th Mo.	1st Q.	July 1	NE	30·15	30·05	70	48	20	
		2	N	30·05	29·99	68	52	17	
		3	NE	29·99	29·97	69	44	12	17
	a.	4	N	29·97	29·88	70	47	19	
	b.	5	NW	30·08	29·95	66	47	15	
		6	W	30·12	30·08	67	56	—	
	Full M.	7	W	30·08	30·01	75	52	33	
	b.	8	SW	30·01	29·95	75	59	24	—
	c.	9	NE	30·01	29·97	73	57	9	—
		10	SW	30·13	30·01	76	58	—	
	d.	11	SW	30·12	30·08	83	59	38	—
	e.	12	S	30·08	29·96	92	63	30	
	f.	13	S	29·96	29·93	96 !	60	35	
	g.	14	Var.	29·96	29·92	94	63	31	
	L. Q. *h.*	15	NE	29·92	29·91	81	62	27	—
	i.	16	Var.	29·97	29·91	88	59	20	—
	k.	17	NW	30·03	29·97	83	57	16	
	l.	18	E	29·97	29·90	86	54	25	
	l.	19	SW	29·90	29·75	86	59	25	
	m.	20	SW	29·78	29·70	75	55	17	
		21	SW	29·71	29·70	78	56	21	
		22	S	29·76	29·71	79	59	16	02
				30·24	29·70	96	44	5·54	0·25

NOTES.—*a.* Misty, a. m.

b. b. Rather windy; a slight shower the 8th at night.

c. A little rain from the N a. m. and at sunset cloudy, with temperature 67°.

d. a. m. a few drops of rain, and much dew at night.

e. A very fine day. The *Cirrus* cloud only appeared. Temperature at 10½ a. m. 86°: the maximum 92° was about 2 p. m. with a fine breeze, so that the heat was not oppressive. Evaporation from a vessel on the ground between 1 and 2 p. m. 0·04 in.; between 4 and 8 p. m.

about the same quantity; in two hours after sunset there evaporated no sensible quantity of water, and dew fell. About 11½ p.m. a bright small meteor passed from SW descending to W.

f. Dew on the grass. Temperature at 9 a.m. 84°. The intense heat of the *maximum* lasted nearly three hours, till about 4 p.m. At 6 p.m. temperature 90°; after which it declined rapidly. The thermometer is defended from the sun by a thick laurel tree, and subject to no other reflection than that of the grass-plot round it. That at the laboratory rose (out of reach of the sun's rays) to 98·5°; but it is contiguous to a large building, and might be affected by a current of heated air from the roof or walls. Another, at Plashet, a mile and a half eastward, indicated 96° as the *maximum* under the shade of a house. Evaporation *in the shade* from 9 to 2, 0·1 in.; from 2 to 7, 0·19 in. The sky was clear till near sunset; then appeared some haze, indicating the fall of dew, in the SE, and a few traces of thunder clouds in the NW. The *vapour point* about 2 p.m. was 65°.

g. At 2½ a.m. several birds were singing by moonlight; the lark on wing and the chimney-swallow were distinguished. The cuckow is said also to have been heard. Sudden strong gusts of wind occurred between 6 and 7 a.m., and 2 and 3 p.m. Some lightning in the W at night.

h. Dew on the grass: a fine breeze from ENE a.m. Much lightning in the W this night: a few drops of rain p.m.

i. No dew: at sunset a smart breeze from SW, with lightning in the NE, and a few drops of rain.

k. Dew; little wind; evening twilight very brilliant, and the clouds highly coloured.

l. Dew.

m. A fine breeze from SSW.

Additional Notes, &c.—Sixth Mo. 29. *Cirri* p.m. pointing downward and to NE: at sunset a beautiful rose-coloured haze on the W horizon.

Seventh Mo. 2. At sunset a low group of *Cirrostratus* in the NW. 4. *Cumulostratus* p.m. and much *Cirrostratus* at sunset. 15. The evaporation in a sheltered spot near the ground was only 0·11, and on the 16th only 0·09 in.

Rain by day 0·06, by night 0·17 in.

RESULTS.

Prevailing Winds Northerly.

Mean elevation of barometer	29·97 in.
Temperature	65·60°
Evaporation	5·54 in.
Rain, &c.	0·25 in.

There has been very little indication of electricity by the rod; a few thunder clouds have appeared at intervals, which at no time threatened a discharge. The lightning we have perceived belonged to storms too distant for the clouds composing them to be visible above our horizon.

To the Editor of the Athenæum.—Sir, your correspondent L. H. takes notice that, on the 14th of July last, at half-past two in the morning, several birds were heard singing, and the lark and the chimney-swallow were observed upon the wing. Give me leave, therefore, to inform him, through the channel of your useful and entertaining miscellany, that on the 12th of the same month, at a quarter before three a. m. I heard the song thrush, *turdus musicus*, as well as the blackbird, *turdus merula*, at Hackney, in Middlesex. I remain, Sir, yours, &c.—S. R.

Gloucestershire.—On the night of Friday the 15th July, after several days of uncommon and oppressive heat, the city of Gloucester experienced a storm of thunder and lightning, which extended many miles round, and exceeded in awful phenomena any one remembered for many years past. Unlike the tempest of the milder zones, the thunder was remarked to roll in one continuous roar, for upwards of an hour and a half, during which time and long afterwards, the flashes of lightning followed each other in rapid and uninterrupted succession. But the most tremendous circumstance of this storm was the destructive *hail shower* which accompanied its progress. It may be doubted, however, whether such a name be applicable; for the masses of ice which fell on the places where the tempest most fiercely raged, bore no resemblance to hailstones in magnitude or formation, most of them being of a very irregular shape, broad, flat, and ragged, and many measuring from three to nine inches in circumference. They appeared like fragments of a vast plate of ice, broken into small masses in its descent towards the earth.—The storm rose in the south-west, and spreading to the north-west, gradually died away in the north-east, from which quarter it was opposed for nearly its whole duration by a strong breeze, particularly hollow and mournful in its sound. The damage done in different parts of this and other counties is very considerable. A fire ball burst in the College Green, carrying away one of the pinnacles on the west end of the cathedral, two cows were killed in a field at Sneedham Green, ten couple of ducks in the fold yard of a gentleman near Cheltenham, and twelve at Upton, near this city. A summer-house on an eminence, belonging to Edward Sheppard, Esq. of Uley, was entirely burnt. At Tewkesbury, many windows that lay in the direction of the storm have been broken, as well as the glass of the hot-houses, &c. in the gardens. At Tetbury, and in its neighbourhood, some houses were set on fire, and many panes of glass broken. Upwards of 600 panes were broken, in the house and garden of Mr. Cave. At Frenchhay, near Bristol, the orchards are stripped of their fruit, and the gardens of their plants. The greatest part of the windows, on the south side of the Broadway are broken, and the tops of the beans in the same neighbourhood have been cut off. The row of trees before Mr. Tucker's house at Moore-end, was so broken, that the leaves and small branches lay in the road a foot deep. At Newton, Corston, and Kelston, most of the windows that lay in the direction of the storm have been broken. The plantations and shrubberies of Mr. Langton, of Newton, were covered with leaves and branches of trees, and the pines, and other fruit in his hot-houses entirely destroyed. In the south and west fronts of Mr. Jollyfe's mansion at Amerdown, not a pane escaped, and the ground was even the next morning covered with the ice that fell. At Radstock, several fields of corn are nearly destroyed, the stalks being mostly cut off in the middle by the masses of ice. At Writhlington, near Radstock, very great damage has also been done to the growing crops. A boy belonging to Mr. Harding, of Keysham, was struck down by the lightning, and his recovery was for some time doubtful: a sheep which was near him was killed. All the glass in the gardens, and a great part in the house of Mills Park, were destroyed, and a great number of pine-apples, grapes, fruit trees, &c. were cut to pieces. A valuable horse belonging to Mr. Hyatt, of Shepton Mallett, was struck dead in the field. William Simkins, jun., mowing with two other men at Kilmarton, Wilts, was killed by the lightning, which also struck down his companions, but they recovered after a short time. In many parishes near Monmouth, roofs of houses, barns, and sky-lights were destroyed by the hail, boughs of trees were cut asunder, and the apples and pears scattered in such quantities that they might have been raked together in heaps. In the park of the Earl of Digby, near Sherborne, the limbs of a large oak tree were shivered in pieces, while the middle or heart was left standing; two sheep were killed under another tree. A flash of lightning struck the back part of a house in the lower town of Bridgenorth; carrying down a large proportion of the chimney, it descended into a bed-room over the kitchen, demolished the windows, and three doors in the room, and forced down the whole front of a large closet, splintering the wood in all directions; three children in bed escaped unhurt. The storm appeared to have spent its fury between Piper's Inn and Ashcot. Here, as well as at Glastonbury, the corn was laid flat, the roads inundated, the apple trees stripped not only of their fruit, but their very leaves, and almost every pane of glass in the village of Ashcot was broken.—(Athenæum).

Thermometer at Paris, (reduced to Fahrenheit's Scale) with the Wind and State of the Sky.

1808.		Max.	Min.	Wind.	
7th Mo. July	10	82·6	55·1	NW	Cloudy.
	11	86·5	59·5	E	Very fine: hazy at noon.
	12	90·2	65·7	SE	Fine, with light clouds.
	13	93·8	61·0	SE	Very fine day.
	14	95·0	66·8	S	The same: hazy at noon.
	15	97·2	70·0	SE	The same.
	16	89·3	68·7	NW	Thick haze and clouds.
	17	81·5	62·7	W	Cloudy.
	18	93·8	74·0	Var.	Much cloud.
	19	95·5	66·3	NE & SW	Cloudy: rain in the evening.
	20	79·6	64·4	W	Cloudy, with rain.
	21	76·1	61·7	S	The same.
	22	79·6	61·2	SW & SE	Cloudy: fine at intervals.

TABLE XXII.

	1808.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
7th Mo.	New M.	July 23	SE	29·76	29·74	85°	59°	19	01
		24	S	29·74	29·70	80	59	10	19
		25	NW	29·75	29·71	70	58	05	33
		26	NE	29·76	29·75	72	56	10	06
		27	E	29·75	29·44	75	58	10	1·88
		28	W	29·59	29·43	67	60	14	29
		29	SW	29·68	29·59	78	60	10	
	1st Q.	30	SW	29·75	29·68	76	55	14	—
		31	E	29·68	29·57	80	61	09	42
8th Mo.		Aug. 1	SW	29.74	29·52	72	57	11	14
		2	NW	30·06	29·74	73	56	18	
		3	W	30·06	30·04	65	54	08	
		4	SW	30·04	29·84	80	50	19	
		5	SW	29·84	29·70	80	61	17	
	Full M.	6	SW	29·78	29·70	77	59	19	—
		7	SW	29·79	29·76	75	59	09	89
		8	SW	29·79	29·56	75	59	16	04
		9	NE	29·69	29·54	72	56	07	75
		10	NW	29·69	29·67	70	59	11	
		11	W	29·73	29·66	74	50	09	
		12	SW	29·73	29·69	78	61	15	01
		13	SW	29·69	29·64	70	60	07	09
	L. Q.	14	SW	29·64	29·60	72	57	13	—
		15	W	29·80	29·64	71	53	16	—
		16	W	29·85	29·76	71	58	17	—
		17	NW	30·00	29·85	68	54	09	
		18	W	30·08	30·00	71	54	12	
		19	NW	30·14	30·08	71	48	07	
		20	Var.	30·16	30·14	76	53	10	
				30·16	29·43	85	48	3·53	5·10

NOTES *from MS. Register.*—Seventh Mo. 24. A shower about 1 p. m. followed by several others; some appearances for thunder in the evening. 25. Morning showery: at 2 p. m. a thunder storm, which lasted till three: after which the wind shifted to W: the lightning was not very vivid, but followed almost instantly by the reports. 26. A very showery day. 27. Heavy rain commenced between 7 and 8 p. m. and continued all night. 28. Very stormy, with almost unceasing rain: the evening cleared up. 30. Very fine day. 31. A thunder storm commenced about 4 p. m. lasting till nine, with continued but not heavy rain: thunder distant, and at last it lightned only.

Eighth Mo. 1. Showery; sun at intervals. 2. Fair: a fine breeze in the evening. 5. *Cirrus* clouds, very beautiful, in the evening. 7. A very large lunar halo about 10 p. m. 8. A heavy storm of wind and rain from 4 to half-past 7 a. m. in which time 0·89 in. of rain fell. 9. A thunder storm p. m. with rain of an hour and a half's continuance. 20. A *Stratus* in the marshes at night.

RESULTS.

Prevailing Winds Westerly.

Mean height of barometer	29·76 in.
Thermometer	65·30°
Evaporation	3·53 in.
Rain, &c.	5·10 in.

The amount of rain is greater by 1·88 in. than that found in the rain gauge at Plaistow. It was obtained in my absence from home by a temporary gauge fixed near the River Lea, at the laboratory, and *less elevated* by about 30 feet than the gauge at Plaistow.

Yorkshire.—At Eglestone, near Barnard Castle, on the 1st August, a most alarming storm of thunder and lightning came on in the afternoon, which caused the water in Blackstone-burn, Gate-beck, and Hill-beck, to overflow. (Some details of the destruction of mills, bridges, &c. follow). At Bedburn, *where not a drop of rain fell,* a dyeing mill was washed away by the flood.

Scotland.—The beautiful wooded bank, immediately opposite to Springfield paper-mill, lately gave way with a dreadful crash into the river Esk, which runs at the bottom, and so completely choaked it up, that not a drop of water passed for several hours. The bank, which is about 200 feet in height, had discovered symptoms of agitation on the preceding day, and, for about an hour before it gave way, the agitation was extremely violent, and the trees were seen falling in all directions; but, when it began to move in a body it was awfully grand and terrific, and the noise was equal to the loudest thunder. The slip is supposed to have been occasioned by water lodged in the bank, which had loosened it from the bed.—(ATHENÆUM.)

TABLE XXIII.

	1808.	Wind.	Pressure.		Temp.		Evap.	Rain, &c.
			Max.	Min.	Max.	Min.		
8th Mo.	Aug. 21	NW	30·15	30·11	73°	51°	7	
	22	NE	30·14	30·11	76	53	7	—
	23	NE	30·11	30·07	72	53	12	1
	24	NE	30·09	30·07	68	54	11	
	25	NE	30·07	29·83	72	50	10	
	a. 26	SW	29·83	29·55	74	49	18	14
	b. 27	NW	29·66	29·55	75	55	10	
	28	W	29·85	29·66	66	47	14	
	29	S	29·85	29·72	68	43	14	
	30	SE	29·72	29·58	73	59	13	6
	c. 31	SW	29·58	29·50	70	58	14	11
9th Mo.	*d.* Sept. 1	SW	29·71	29·54	68	54	18	10
	2	SW	29·79	29·71	67	55	13	18
	3	W	29·79	29·76	67	56	10	3
	4	W	29·78	29·76	66	48	9	—
	c. 5	S	29·76	29·62	67	54	11	6
	6	SW	29·72	29·66	68	52	11	5
	c. 7	SW	29·66	29·57	67	57	15	2
	8	SW	29·57	29·30	65	50	19	4
	9	S	29·30	29·28	64	54	7	47
	e. 10	SE	29·40	29·30	63	52	5	12
	11	W	29·58	29·40	62	52	3	48
	f. 12	SE	29·62	29·58	62	52	2	41
	13	Var.	29·71	29·62	67	53	6	20
	g. 14	N	29·97	29·71	68	54	5	
	g. 15	NE	30·23	29·97	71	54	17	
	g. 16	NE	30·23	30·21	67	44	25	
	g. 17	E	30·21	29·96	66	54	16	
	18	Var.			68	57	16	10
	g. 19	SW			67	50	10	
			30·23	29·28	76	43	3·48	2·58

NOTES.—*a.* Misty morning.

b. A heavy shower between 7 and 8 a.m.

c. Much wind by night.

d. Squalls with rain.

e. Very wet a.m.; fair p.m. but distant thunder about five.

f. Lightning in the W after 10 p.m.

g. Fair days, with misty mornings, and abundance of dew.

RESULTS.

Winds Variable.

Mean height of barometer	29·76 in.
Thermometer	60·34°
Evaporation	3·48 in.
Rain	2·58 in.

Of which there was noted by day 0·78 in. by night 0·42 in.

Character of this period wet and changeable. The *Manchester Register* presents the following points of comparison during this period. Eighth month, 22, 23, 24, Wind there, NE; with us, SE: barometer steady with both. 25, 26, Both barometers descend, with a change to SW, followed by rain. 29, Wind S, with us; there, strong at W. 30, SE, with us; SW and W, strong, at Manchester. 31, At night, this strong current appears to have reached us. Ninth month, 3 to 8, Winds with us, W, S, and SW, and 0·2 of rain; with them, the same winds, but mixed with SE, and 0·87 of rain. 9 to 13, With them, wind E and NE, and 0·27 of rain: with us, the winds variable and mixed with SE, and 1·68 of rain. 14 to 17, With us, NE, N, and E, and fair: the same with them, except a mixture of SE, (now dry, having probably left its water with us). 18, Variable winds at each station, with about the same small quantity of rain. 19, Fair, with a westerly wind, at both stations.

TABLE XXIV.

	1808.	Wind.	Pressure.		Temp.		Evap.	Rain, &c.
			Max.	Min.	Max.	Min.		
9th Mo.	*b. a.* Sept. 20	W	30·29	30·20	68°	44°	9	—
	b. a. 21	W	30·20	30·12	68	45	5	1
	b. a. 22	Var.	30·12	29·60	67	51	—	23
	23	N	29·90	29·60	59	48	18	1
	24	NW	30·03	29·90	56	46	9	
	25	Var.	30·04	29·90	60	41	5	
	b. a. 26	Var.	29·90	29·90	64	47	8	
	27		29·90	29·77	55	36	9	
	c. 28		29·77	29·47	56	36	5	
	29		29·49	29·47	58	38	4	
	30		29·77	29·49	51	34	5	
10th Mo.	Oct. 1		29·77	29·70	54	38	7	
	2		29.80	29·70	54	34	3	
	b. 3		30·04	29·80	55	46	4	
	b. 4		30·05	30·04	56	41	2	
	h. 5		30·05	29·90	62	46	4	40
	d. 6	SW	30·08	30·00	65	48	7	
	e. 7	W	30·00	29·81	57	46	12	19
	f. 8	NW	29·70	29·31	52	41	14	1
	9	NW	29·77	29·71	53	38	9	
	a. 10	W	30·01	29·77	57	37	6	
	a. 11	W	29·92	29·80	56	41	7	6
	a. 12	NW	30·06	29·92	54	34	9	
	13	NW	30·06	29·50	50	40	8	6
	g. 14	SW	29·50	29·18	57	38	12	4
	f. 15	W	29·52	29·18	48	42	4	3
	f. 16	W	29·53	29·48	51	40	10	7
	f. 17	NW	29·73	29·53	49	38	7	
	f. 18	SW	29·73	29·50	54	38	11	3
			30·29	29·18	68	34	2·13	1·14

NOTES.—*a.* Much dew a.m.: the product in the gauge on the 21st was *dew*.

b. Misty.

c. Lunar halo at night.

d. A *Stratus* on the marshes.

e. A stormy night.

f. Windy.

g. a.m. stormy with rain. Wind south.

h. This is the product of rain fallen at different intervals (not noted) since the 26th.

Additional Notes, &c.—Tenth Mo. 3, 4. A *Stratus* at night. 13. A fine day; cloudy after sunset; the depression of the barometer was chiefly by night.

Greenock, Oct. 8.—It blew a heavy gale from SW all yesterday, but about midnight it suddenly chopped round to the NW, and has since continued to blow almost a hurricane.—(PUB. LEDGER.)

Chester, October.—The tremendous storm on the 8th instant has done considerable damage to the shipping in the Mersey.—(PAPERS.)

Manchester, Oct. 8.—Very boisterous, with a great fall of rain, *viz.* 0·78 in. Wind NW. This was a very rainy *month* there, the total being stated at 5·32 in. Mean of barometer 29·49 in.—*Hanson.*

The 8th of tenth month appears to have been very wet at Paris, with the wind strong at W. Barometer about 29·5 in. English.

Fogs preceded this great flow to the eastward alike at Manchester, London, and Paris, and by nearly the same short interval at each station.

RESULTS.

Prevailing Winds Westerly.

Mean height of barometer..............	29·78 in.
thermometer	48·84°
Evaporation	2·13 in.
Rain	1·14 in.

Of which by night 0·52 in. remainder by day and night.

TABLE XXV.

	1808.	Wind.	Pressure.		Temp.		Evap.	Rain, &c.
			Max.	Min.	Max.	Min.		
10th Mo.	Oct. 19	NW	29·68	29·50	49°	40°	8	
	a. 20	NW	29·68	29·29	53	42	5	36
	b. 21	W	29·55	29·48	54	38	10	
	c. 22	W	29·79	29·55	51	34	8	
	23	SW	29·55	29·30	52	42	10	42
	d. c. b. 24	SW	29·69	29·55	54	38	11	
	e. 25	SW	29·69	29·15	54	46	11	14
	1st Q. *b.* 26	SW	29·40	29·15	56	42	13	
	e. d. 27	SW	29·42	29·39	53	40	8	80
	28	SE	29·65	29·39	53	43	6	25
	f. 29	S	30·05	29·65	54	40	3	21
	30	NE	30·33	30·05	54	43	3	
	g. 31	NE	30·33	30·27	52	44	7	
11th Mo.	*b.* Nov. 1	NE	30·27	30·15	51	47	14	
	2	NE	30·15	30·06	54	47	13	
	Full M. 3	NE	30·30	30·15	48	42	—	
	h. 4	NE	30·30	29·91	50	39	30	—
	5	Var.	29·92	29·88	47	25	—	
	i. c. 6	E	29·88	29·72	45	36	7	
	7	E	29·72	29·66	47	41	4	
	g. h. 8	NE	29·66	29·57	52	43	3	8
	9	NE	29·75	29·57	53	42	2	
	k. 10	NE	29·84	29·72	54	42	—	
	L. Q. *b.* 11	NE	30·07	29·84	49	36	—	
	12	NE	30·13	30·10	46	37	31	
	c. 13	NE	30·12	30·06	41	30	—	
	14	Var.	30·11	30·00	42	28	—	
	c. 15	S	30·00	29·63	51	33	9	
	e. b. 16	S	29·63	29·29	54	49	14	9
	e. 17	S	29·29	28·81	56	44	7	12
			30·33	28·81	56	25	2·37	2·47

NOTES.—*a.* Very dark and cloudy a. m. the wind rising.

b. Windy.

c. Hoar frost.

d. Hail.

e. Stormy nights.

f. Swallows seen for the last time.

g. Misty, the trees dripping.

h. Showers in the evening.

i. Much rime on the trees a. m.: the leaves fall abundantly; a large mulberry tree cast its whole foliage in an hour or two.

k. Much dew a. m.

l. No dew a. m. the sky being veiled with clouds. Some drizzling rain followed.

Additional Notes, &c.—Tenth Mo. 20. This nocturnal fall of the barometer was preceded by a sensible fluctuation: the tendency was first to rise. 27. *Nimbi,* well formed, at intervals through the day: at night, two small meteors almost at the same instant.

Eleventh Mo. 16. Numerous small fluctuations preceded this rapid fall of the barometer.

Deal, Oct. 24.—Last night and this morning it blew very hard from the SSW.

Torbay, Oct. 26.—We have had heavy gales from the SW for several days, accompanied with dreadful squalls and showers.—A similar account from Plymouth.

Cork.—A heavy gale on the night of Nov. 17, the wind SW, shifting to NW.—(PUBLIC PAPERS.)

Cotte.—Journ. de Physique, v. 68, p. 335, notes, under Oct. 26, an earthquake at Leghorn, and very stormy weather, with a low barometer at Montmorency.

RESULTS.

Winds Variable: the prevailing one NE, attended with dry weather. The South-west has been stormy and wet.

Mean height of barometer	29·76 in.
temperature	45·36°
Evaporation	2·37 in.
Rain	2·47 in.

Of which by night 2·08 in.

TABLE XXVI.

	1808.	Wind.	Pressure. Max.	Pressure. Min.	Temp. Max.	Temp. Min.	Evap.	Rain, &c.
11th Mo.	New M. *a.* Nov. 18	NW	29·30	28·72	49°	32°	9	36
	19	SE	29·73	29·30	43	34	6	
	b. 20	SW	29·77	29·74	54	38	5	
	21	SW	30·20	29·74	56	38	10	
	c. 22	SW	30·20	30·08	50	38	5	
	23	NW	30·18	30·08	54	44	4	2
	1st Q. 24	SW	30·18	29·97	50	43	—	40
	d. 25	SW	29·98	29·95	53	44	9	
	e. 26	W	29·95	29·47	56	47	2	2
	e. 27		29·77	29·40	54	30	—	2
	g. f. 28	NW	29·83	29·77	43	30	7	
	h. f. 29	SW	29·77	29·10	50	34	3	46
	80	W	29·35	29·10	48	35	8	
12th Mo.	*e.* Dec. 1	SW	29·45	29·15	49	37	6	16
	e. 2	SW	29·43	29·15	49	41	12	
	Full M. 3	N	30·02	29·40	50	42	9	
	4	SE	30·31	30·02	46	27	3	
	f. 5	SW	30·31	29·97	52	30	4	—
	e. 6	NW	29·86	29·72	53	33	11	3
	k. e. 7	NW	29·93	29·86	41	36	9	
	8	N	29·97	29·93	43	37	—	
	f. 9	NW	30·07	29·97	42	32	7	
	L. Q. *f.* 10	NW	30·30	30·07	41	31	1	
	i. 11	W	30·30	30·27	40	30	1	
	i. 12	NW	30·34	30·27	42	36	2	
	13	W	30·38	30·36	39	31	0	
	e. 14	N	30·36	30·08	42	34	2	5
	e. 15	N	30·11	30·07	31	32	3	
	l. 16	W	30·07	29·84	37	26	—	
			30·38	28·72	56	26	1·38	1·52

NOTES.—*a.* Snow on the ground a. m. followed by clearer weather.

b. Much wind last night: very cloudy. The maximum of temp. obtained at 9 a. m.

c. Windy: maximum at 9 again.

d. The same phenomena repeated.

e. Windy.

f. Hoar frost.

g. Large lunar halo.

h. Stormy night: snow fell in a more elevated part of the county.

i. **Misty air.**

k. **Some snow a. m.**

l. **A bright small meteor moving from S towards W, soon after 6 p. m.**

Additional Notes, &c.—Twelfth Mo. 9. Ice on the water: probably rather from the effect of evaporation than the temperature of the air.

Plymouth, Nov. 18.—A heavy gale at WNW.—(PAPERS).

As the fall of the barometer, terminating about this day, was a great and continued one, it may be proper to note, that *Cotte*, (Journ. de Phys. *ubi antea*) places under this date a storm with high tides on the coast of Normandy, disastrous inundations in the department of La Lozere, &c. near the gulf of Lyons, and much wind with a low barometer at Montmorency.

December 8.—A violent storm in the Channel, and on the coast of Holland. But *little variation* in the barometer (though cloudy and windy) at Montmorency. *Cotte, (ubi supra).*

He notes likewise the following singular circumstances of temperature in this month. On the 13th, thermometer at Altona, —14 Reaum. about *zero* of Fahrenheit, at Montmorency, 41° Fahrenheit: and on the 14th, 40° at Montmorency, while it was only 35° at Venice and Naples!

Lunar Rainbow.—The following notice of this rare phenomenon has been handed to me from my friend John Capper, of Stoke Newington. "On the 1st of 12th month (Dec.) 1808, a little after 5 o'clock a. m. I observed a lunar rainbow; the moon being near setting to the north of west. It was of unequal brightness. In the most northerly part of it, near the earth, the colours were very distinct, in the other parts they were scarcely distinguishable; and it had, on the whole, the appearance of a white arch, at the usual distance from which the second (or doubly reflected) bow was visible. Opposite the brightest parts, at the northern end, it was very strong, and coloured, as the inner bow in that place was. The white part did not last more than ten minutes; the coloured part continued visible much longer."

RESULTS.

Winds Westerly.

Mean height of barometer	**29·86 in.**
temperature	**41·01°**
Evaporation	**1·38 in.**
Rain	**1·52 in.**

Of which noted by night 0·63 in.

TABLE XXVII.

	1808.	Wind.	Pressure.		Temp.		Evap.	Rain, &c.
			Max.	Min.	Max.	Min.		
12th Mo.	New M. *a.* *b.* Dec. 17	N	29·65	29·45	38°	24°	—	—
	c. 18	N	29·65	29·62	31	26	—	—
	19	N	29·71	29·68	32	25	—	—
	20	N	29·99	29·71	30	14	—	
	d. 21	SW	29·99	29·20	34	20	—	—
	22	Var.	29·42	29·20	33	27	—	—
	e. 23	E	29·45	29·39	31	28	—	—
	1st Q. 24	Var.	29·61	29·56	32	25	—	
	f. 25	NW	29·55	29·50	30	21	—	—
	g. 26	E	29·55	29·49	33	23	—	—
	a. 27	E	29·60	29·55	36	34	34	14
	a. 28	E	29·55	29·52	38	36	—	—
	29	E	29·52	29·49	42	37	4	15
	30	E	29·60	29·50	44	38	5	
	h. 31	E	29·62	29·60	38	36	1	12
1st Mo.	Full M. 1809. Jan. 1	E	29·60	29·49	39	38	—	—
	i. 2	NE	29·49	29·35	40	30	—	—
	3	NE	29·65	29·49	30	28	—	—
	k. 4	E	29·70	29·65	33	30	—	—
	k. 5	SE	29·65	29·56	38	32	8	19
	k. 6	SE	29·56	29·43	48	36	6	24
	k. 7	SE	29·43	28·80	45	39	5	16
	k. 8	S	29·37	28·50	46	37	4	23
	L. Q. *l.* 9	S	29·25	29·20	44	36	1	39
	k. 10	NW	29·38	29·16	46	34	4	2
	m. 11	W	29·49	29·38	47	36	1	
	12	N		29·49	40	30	—	—
	13	N	29·82		37	28	—	—
	14		29·82	29·77	34	29	—	—
	n. 15	NE	30·08	29·77	29	26	12	20?
			30·08	28·50	48	14	0·85	1·84

NOTES.—*a.* Misty.

b. About 2 p. m. a heavy squall from NW with rain, sleet, and snow, giving strong sparks from the rod: the night proved very stormy.

c. Clear; brisk wind; snow at intervals, and pretty much of it in the night. Wild geese migrate in large flocks.

d. Rime on the trees. *Minimum* of temperature at 9 a. m.

e. Snow at intervals for three days past, and much this night. In the day it fell very sparingly, and regularly crystallized in *stars*.

f. Small rain, freezing on the ground.

g. Clear morning; sleet in the night.

NOTES, &c. *(continued)*.

h. Cloudy for three days past.

i. Snowy morning after a wet evening.

k. Cloudy and windy weather. On the 6th a meteor of moderate size, passing eastward.

l. Hoar frost: *Cirrostratus:* a *Nimbus* in the S. These successive indications were followed by steady rain.

m. A fine day. The whole level, bordering on the Lea from Stratford upwards is now, by the continued rains and swelling of the river, several feet under water.

n. Snow at intervals. The inundation has subsided.

Additional Notes, &c.—Twelfth Mo. 17. This night is described in the Papers as very stormy, with the following differences in the wind: Torbay and Deal, NW. Yarmouth, NNE. Sheerness, NE. Ramsgate, (with much snow) N.

17, 18, 19. A great snow in the Netherlands, and disasters by *avalanches* in Switzerland. *Cotte.*

Aberdeen, Dec. 31.—We have experienced a strong gale from ESE to SE, with squalls and rain, which has prevented all intercourse by shipping, there not being a single arrival or sailing for eight days.—(PUB. LEDGER).

Scotland, December.—A *whale* ran itself on shore on the banks of the Frith, between Alloa and Cambus: where it was with difficulty killed by the country people. Considerable damage occurred in several places by the high wind, heavy rain, and floods; and in one instance by lightning, which perforated a large building in several places, as if it had been battered by cannon shot.—(ATHENÆUM).

Plymouth Dock, Jan. 7.—Last night it blew a tremendous hurricane, with heavy rain till daylight this morning, when the weather moderated.—(PUB. LEDGER).

RESULTS.

Prevailing Winds Easterly.

Mean height of barometer .... 29·52 in.
thermometer .... 33·68°
Evaporation .... 0·85 in.
Snow and rain .... 1·84 in.

Character cloudy and frosty, with frequent rain and snow. The barometer has departed little from the mean, save in one great *depression*, the crisis of which occurred about 2 p.m. the 8th; and though the subsequent elevation went on at the rate of more than 0·1 inch per hour, the wind was quite moderate. It is very rare to observe so steady a wind from the SE, as that which preceded this fall of the barometer.

Rain noted as by night 0·63 in.

TABLE XXVIII.

	1809.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
1st Mo.	New M.	Jan. 16	E	30·12	30·07	30°	25°	—	
		17	E	30·07	29·94	30	18	—	
		18	E	29·87	29·77	28	19	—	
		19	Var.	29·53	29·48	30	23	—	
		20	N	29·50	29·43	33	31	—	—
		21	Var.	29·54	29·14	35	31	—	—
		22	Var.	29·65	29·08	35	19	—	—
	1st Q.	23	Var.	29·73	29·44	33	27	—	—
		24	W	29·45	29·40	45	34	15	1·89
		25	SW	29·82	29·47	48	36	5	27
		26	SW	——	29·18	51	40	—	
		27	SW	29·55	——	52	46	18	
		28	S	29·55	29·22	56	47	14	
		29	W	29·36	28·93	53	43	15	1
		30	W	29·75	28·70	51	37	12	23
	Full M.	31	S	29·94	29·76	50	37	4	
2d Mo.		Feb. 1	SW	29·76	29·52	54	48	14	
		2	SW	29·52	29·20	51	49	—	—
		3	SW.	29·40	29·20	55	44	19	12
		4	SW	29·45	29·37	51	41	7	7
		5	SW	29·43	29·37	51	41	8	23
		6	SW	29·93	29·30	51	38	10	12
		7	E	30·00	29·90	39	33	10	—
	L. Q.	8	E	29·90	29·40	44	33	5	25
		9	SE	29·31	29·29	54	44	9	1
		10	S	29·29	29·11	52	44	14	2
		11	SW	28·85	28·75	51	42	11	7
		12	SW	28·80	28·70	51	40	10	8
		13	SW	29·20	28·80	53	43	14	1
				30·12	28·70	56	18	2·14	3·38

The period I am now reporting is so extraordinary in its character, that I must exchange the usual form of notes for a continued narration.

The wind has been inconstant, though the greatest quantity of air has undoubtedly flowed from the SW. The movements of the barometer have been, in like manner, desultory, and the *mean* much lower than for a considerable time past: there have been, moreover, some great and pretty sudden depressions. The temperature (after the thaw) was very high for the season, and the evaporation and precipitation great.

The new moon was very conspicuous on the 17th, the whole disk appearing well defined. A brilliant small meteor descended on the SE horizon about 6 p.m. On this and the preceding day the snow exhibited its beautiful blue and pink shades at sunset, and there was a strong evaporation from it's surface. I found a circular area, of five inches diameter, to lose 150 grains troy, from sunset on the 15th to sunrise next morning, and about 50 grains more by the following sunset; the gauge being exposed to a smart breese on the house top. The curious reader may hence compute for himself, the enormous quantity raised in those 24 hours, without any visible liquefaction, from an acre of snow: the effects of the load thus given to the air were soon perceptible. On the 18th, though the moon was still conspicuous, the horns of the crescent were obtuse. On the 19th appeared the *Cirrus* cloud, followed by the *Cirrostratus*. In the afternoon a freezing shower from the eastward glazed the windows, encrusted the walls, and encased the trees, the garments of passengers, and (it is said) the very plumage of the birds with ice*. Its composition, which I examined on a sheet of paper, was no less curious than these effects. It consisted of hollow spherules of ice, filled with water; of transparent globules of hail; and of drops of water at the point of freezing, which became solid on touching the bodies they fell on. The thermometer exposed from the window indicated 30,5°. This shower was followed by a moderate fall of snow. From this time to the 24th we had variable winds and frequent falls of snow, which came down on the 22d in flakes as large as dollars, with sleet at intervals. On the 24th a steady rain from W decided for a thaw. This and the following night proved stormy: the melted snow and rain, making about two inches depth of water on the level, descended suddenly by the rivers, and the country was inundated to a greater extent than in the year 1795. The River Lea continued rising the whole of the 26th, remained stationary during the 27th, and returned into its bed in the course of the two following days. The various channels by which it intersects this part of the country were united in one current, above a mile in width, which flowed with great impetuosity, and did much damage. From breaches in the banks and mounds, the different *levels*, as they are termed, of embanked pasture land, were filled to the depth of eight or nine feet. The cattle, by great exertions, were preserved, being mostly in the stall; and the inhabitants, driven to their upper rooms, were relieved by boats plying under the windows. The Thames was so full during this time, that no tide was perceptible; happily, however, its bank suffered no injury; the evacuation of the water from the levels has in consequence proceeded with little interruption, and is now (23d of 2d month) pretty fully effected. No lives were lost in these parts. Several circumstances concurred to render this inundation less mischievous than it might have been, from the great depth of snow on the country. It was the time of *neap* tide; the wind blew strongly from the *westward*, urging the water *down* the Thames; to which add moonlight nights, and a temperate atmosphere, both very favourable to the poor, whose habitations were filled with water.

On the 28th appeared a lunar halo of the largest diameter. On the 29th, after a fine morning, the wind began to blow hard from the south, and during the whole night of the 30th it raged with excessive violence from the west, doing considerable damage. The barometer rose, during this hurricane, one-tenth of an inch per hour. The remainder of the moon was stormy and wet, and it closed with squally weather; which, with the frequent appearance of the rainbow, indicated the approach of a drier atmosphere, a change on few occasions within my recollection more desirable.

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* Birds thus disabled were seen lying on the ground in great numbers in different parts of the country. Nineteen rooks were taken up alive by one person at Castle Eaton Meadow, Wilts.—(PUB. LEDGER).

See on this subject WHITE, *Nat. Hist. of Selborne*, vol. ii. p. 302.

Additional Notes, &c.—Second Mo. 12. At 9 a. m. the barometer was rising, p. m. it fell again, rose in the evening, fell in the night, and next morning was again found rising: most of these oscillations were of course but small: they were followed by squalls of wind.

The Public Papers give numerous details of inundations consequent on the thaw of the 24th ultimo, which appear to have prevailed in low and level districts all along the east side of this island: but in no part with more serious destruction of property, public works, and the hopes of the husbandman, than in the Fens of Cambridgeshire: where by some accounts 60,000, by others above 150,000 acres of land have been laid under deep water, through an extent of 15 miles.

The following fact is worth preserving:—"About 500 sacks were filled with earth, and laid on the banks of the Old Bedford River, at various places, where the waters were then flowing over. This proved effectual in saving that part of the country from a general deluge."

RESULTS.

Prevailing Wind South-west.

Mean height of barometer..............29·44 in.
thermometer............40·86°
Evaporation.......................... 2·14 in.
Rain and snow .... 3·38 in.

Portsmouth, Jan. 29.—The whole of this day it has blown a heavy gale from WSW, which now (7 p. m.) continues with unabated fury. A subsequent account says,—"Upwards of five tons of lead, in three pieces, were blown off the roof of the Clock Storehouse, in Portsmouth Dock-yard. One piece, of about 30 cwt. and another of about 40 cwt. were carried, in different directions, near 40 yards; and the other piece was carried 25 yards. It being so extraordinary a circumstance, the pieces of the lead were weighed the next morning, and the distances they fell accurately measured, for the purpose of being registered at the yard."

Plymouth Dock, Feb. 8.—A most tremendous hurricane accompanied with a very heavy rain, commenced about 11 last night, and has continued ever since without the least intermission. We have had much thunder and lightning here from the late storms.—(PAPERS).

Earthquakes in Scotland.—Convulsions of the earth, resembling earthquakes, have lately been felt in various parts of the Highlands. One was felt at Dunning, in Perthshire, on the 18th of January, of which Mr. Peter Martin, surgeon, gives the following account:—He was on his way home, about two in the morning, when his attention was suddenly attracted by a seemingly subterraneous noise, and his horse immediately stopping, he perceived the sound to proceed from the north-west. After continuing for about half a minute, it became louder and louder, and apparently nearer, when, all on a sudden, the earth gave a perpendicular heave, and, with a tremulous waving motion, seemed to roll or move in a south-east direction. The noise was greater during the shock than before it, and for some seconds after it was so loud, that it made the circumjacent mountains re-echo with the sound, after which, in the course of about half a minute, it gradually died away. At this time the atmosphere was calm, dense, and cloudy, and for some hours before and after there was not the least motion in the air. Fahrenheit's thermometer, when examined, about half an hour after the shock, indicated a temperature of 15° below the freezing point of water. The preceding day had been calm and cloudy; thermometer 8 a.m. 14°, 8 p.m. 13°. The morning of the 18th was calm and cloudy, but the day broke up to sunshine; thermometer 8 a.m. 19°, 8 p.m. 16°. About the same time a similar shock was felt at the bridge of Allan, near Stirling, where it was so violent along the foot of the hills as to make the tables and chairs rattle. On the 9th of January, about half-past five in the morning, a smart shock was felt at the village of Comrie, near Crief, the noise attending which was loud and greatly prolonged. During the time of the shock the air was calm and serene. The moon shone bright, and the sky was soon afterwards covered with whitish clouds, moving rapidly from NW to SE. The following is the substance of a letter from Strontian, in the west of Argyleshire: "On Tuesday, the 31st of January, we distinctly felt *five* shocks of an earthquake. It extended over the neighbourhood, and was accompanied with a noise like distant thunder. On Wednesday there was another, on Saturday following there were two more, on Sunday two, and this day (Feb. 6) one. The first, on Saturday, was the most severe; every moveable in my house was displaced, and the building much shaken, but fortunately alarm was the only consequence, as I have heard of no accident. The shocks were distinctly felt by the miners below ground; they continued only for a few seconds, and have all taken place between five and seven in the evening."—(ATHENÆUM).

TABLE XXIX.

	1809.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
2d Mo.	New M.		Feb. 14	SW	29·67	29·20	52°	41°	9	—
		a.	15	SW	29·80	29·53	53	42	7	5
			16	S	29·56	29·52	52	46	8	3
			17	SW	29·80	29·77	55	45	11	—
		b.	18	SW	30·47	29·77	57	35	10	
		c.	19	SW	30·47	30·17	54	45	9	
			20	SW	29·99	29·90	51	38	10	—
		d.	21	NW	30·35	29·99	42	30	7	—
	1st Q.		22	NW					—	
			23	Var.	30·35		52	33	14	—
			24	SW	30·35	30·25	48	38	6	—
		e.	25	W	30·45	30·25	47	29	—	—
		f.	26	SW	30·45	30·37	50	33	10	
		g.	27	SW	30·37	30·33	53	32	4	
		g.	28	SW	30·33	30·24	53	35	4	2
3d Mo.			March 1	Var.	30·39	30·24	51	38	3	11
	Full M.		2	NE	30·45	30·37	47	32	9	
			3	NE	30·37	30·16	46	35	9	—
			4	Var.	30·18	30·13	48	39	4	—
			5	N	30·29	30·18	43	34	6	1
		h.	6	N	30·39	30·29	40	35	4	
		i.	7		30·49	30·39	40	33	0	
	L. Q.		8	W	30·49	30·31	47	32	2	
		k.	9	W	30·31	30·23	55	39	5	
		l.	10	E	30·27	30·23	46	31	18	
		l.	11	NE	30·27	30·09	47	36	12	
		m.	12	NE	30·20	30·09	50	34	21	
		m.	13	NE	30·25	30·20	47	34	14	
		n.	14	NE	30·44	30·25	46	36	10	—
		n.	15	NW	30·35	30·24	48	33	7	
					30·49	29·20	57	29	2·33	0·22

NOTES.—*a.* Cloudy and windy, with showers.

b. The temperature higher at 9 a. m. than for the last 24 hours. Barometer wavering. The ground springs, or those of the superficial strata, begin to subside, so that it is now possible to dig without puddling the soil.

c. a. m. much dew. At sunset the *Cirrus* cloud, highly coloured, with a strong pink tinge in the horizon. Some wind in the night.

d. a. m. very cloudy; a squall with a little hail, then a fair day.

e. Slight showers, with a clear air the last four days. Lunar halo, small and coloured.

f. Hoar frost; very misty.

g. Still misty weather: coloured halo, as also the following night.

h. Slight showers and misty weather for several days past.

i. A very wet mist this night. The evaporation gauge received an increase of about one hundredth of an inch.

k. The atmosphere begins to clear below.

l. Fine clear weather: smart breeze from NE.

m. Much dew, a.m. windy.

n. Cloudy: a little rain from the N, a.m. the 14th.

Additional Notes, &c.—Second Mo. 14. During a heavy storm of wind, accompanied by thunder, rain, and hail, the house of a baker in New Navy Row, *Plymouth Dock*, was struck by lightning, and together with the two adjoing houses materially damaged. On the *same day*, at *Paris*, the barometer being just past the minimum for the month, the wind very strong at W, with much rain, there was thunder at 6 p.m. and a house near the city was struck by lightning. A portion of the bell-wire in this house was dispersed and fixed as a very extensive *stain* in the wall of the apartment. At the end of vol. 69, of the Journ. de Physique, is a curious engraving of this picture: exhibiting one portion of the iron thrown off each way, at right angles from the course of the wire, in mossy ramifications; and another above it more perfectly dissipated, in a figure resembling an electrified lock of hair in the midst of a cloud of smoke. The stain measured six feet by four.

Second Mo. 17. Temperature 55° at 9 a.m. 21—25. Occasional slight showers: a pretty clear air but chilly.

Third Mo. 11. *Cirrocumulus* a.m. succeeded p.m. by *Cirrostratus.*

Accidents by Lightning.—The following singular circumstance took place on board the Warren Hastings, recently launched at Portsmouth, while the vessel was moored at the Mother-bank:—The morning being fine, it was deemed necessary to get up the top-gallant masts, which occupied some hours. About three o'clock in the afternoon the atmosphere was overcast to the westward, and every appearance indicated the approach of a violent storm. Several alert sailors were sent aloft to strike the top-gallant masts as speedily as possible, but while lowering them the wind blew tremendously, and the rain fell in torrents, accompanied by heavy claps of thunder. In the midst of the confusion, occasioned by the storm, three distinct balls of fire were emitted from the heavens; one of them fell in the main-topmast cross-trees, killed a man on the spot, and set the main-mast on fire, which continued in a blaze for about five minutes, and then went out. The seamen both aloft and below were almost petrified with fear. At the first moment of returning recollection, a few of the hands ran up the shrouds to bring down their dead companion, when the second ball struck one of them, and he fell, as if shot by a cannon, upon the guard iron in the top, from which he bounded off, into the cross jack braces. Finding that he still survived, he was relieved from his perilous situation, and brought upon deck with his arms much shattered and burnt. This poor fellow was expected to undergo immediate amputation, as the only means of saving his life. The third ball came in contact with a Chinese, killed him, and wounded the main-mast in several places; the force of the air, from the velocity of the ball, knocked down Mr. Lucas, the Chief Mate, who fell below, but was not much hurt. For some time after the storm subsided, a nauseous, sulphureous smell continued on board the ship. (Apparent date by the Papers, Feb. 14.—ATHENÆUM.)

RESULTS.

Winds variable; the Westerly have blown longest, and the Easterly with the greatest force; though neither have much exceeded a breeze.

Mean height of barometer	30·17 in.
thermometer	42·46°
Evaporation	2·33 in.
Rain	0·22 in.

Character of this moon quite the reverse of the last. Barometer remarkably high and steady: temperature rather low and uniform: frequent mists, dews, and hoar frost: winds moderate and drying, with very little return of water from the clouds; so that much of the period had rather an *Autumnal* aspect. It has been highly favourable to the agricultural business of the season.

Prognostics of Rain from the Habits of Animals.

I have no doubt there are some of these on which we may place considerable reliance, as indicative of a present tendency to rain. I should explain them simply by the supposition of certain feelings in the animal, induced by the present state of the air, and connected with its comfort or preservation.

The "Bucula cœlum suspiciens patulis captavit naribus auras" of Virgil must be familiar to classical readers. I once observed this action of snuffing the air, very decidedly, in a young heifer; and conceived it to be occasioned by the fresh smell of the turf, watered by some showers which had been falling to windward.

Walking to-day (Fourth Month, 6, 1809), I observed the ducks busy throwing the water over their backs with their heads. Having heard this action cited as portending a shower, I looked up for the cloud: but chancing to direct my view the wrong way, saw nothing like rain approaching, and rejected the prognostic as futile. I had not proceeded, however, ten yards from the spot ere some drops began to fall from the zenith, and, on a more attentive examination, I found the *Nimbus* behind me. In about an hour it set in for a wet afternoon.

Some snow and hail had fallen at intervals, but no rain, for a week past; and the ground was dusty.

The reason of this I take to be, that these fowls, though so much in the water, do not love to be wet to the skin; and therefore, when warned by the peculiar sensation preceding rain, they presently close their plumage, by throwing a sudden weight of water on their bodies in the direction of the growth of the feathers.

On another occasion I observed several of these fowls run suddenly out from under a shed, with signs of much gratulation, on the immediate approach of a heavy shower; yet before a single drop had fallen. This action might be connected with the expectation of a supply of food; insects being brought down from the air, and worms and snails out of their strong holds, on such occasions.

TABLE XXX.

	1809.	Wind.	Pressure,		Temp.		Evap.	Rain, &c.
			Max.	Min.	Max.	Min.		
3d Mo.	New M. March 16	NW	30·24	30·18	52°	42°	8	
	a. 17	NW	30·18	30·15	56	43	6	
	18	NE	30·15	30·05	55	37	16	
	b. 19	E	30·00	29·97	52	42	14	2
	c. 20	Var.	30·12	29·97	53	38	4	
	21	E	30·13	30·08	53	39	3	
	f. d. 22	S	30·13	29·94	66	37	12	
	g. d. 23	Var.	29·94	29·64	64	47	21	1
	1st Q. *b.* 24	W	29·64	29·32	57	43	10	11
	25	SE	29·32	29·11	52	33	5	
	e. 26	S	29·30	29·11	55	31	7	
	i. 27	E	29.40	29·30	56	36	8	
	k. 28	NE	29·71	29·40	56	40	6	15
	29	N	29·82	29·71	47	32	3	
	30	NE	29·81	29·79	44	39	11	
	Full M. *b.* 31	NE	29·79	29·73	50	36	21	
4th Mo.	*l. b.* April 1	N	29·80	29·71	45	30	10	—
	m. 2	NW	29·90	29·78	45	27	—	—
	n. 3	NW	30·07	29·90	46	26	—	—
	n. 4	NW	30.29	30·07	43	24	—	—
	5	SW			44	26	—	—
	L. Q. 6	SW	30·15		48	34	26	14
	d. 7	Var.	30·33	30·15	50	31	7	
	8	SW	30·33	30·12	49	34	13	
	9	SW	30·12	29·89	54	40	7	3
	10	NW	29·89	29·53	56	45	10	—
	11	N	29·77	29·37	53	30	7	15
	e. 12	SW	29·77	29·30	52	40	13	3
	o. 13	SW	29·30	29·09	53	37	15	10
			30·33	29·09	66	24	2·63	0·74

Notes.—*a.* The bat and black beetle come abroad. The roads are become unpleasantly *dusty*.

b. Cloudy, windy.

c. c. Very misty mornings. The mist as it broke away on the 27th, exhibited a faint white *bow* in the NW.

d. Much dew.

e. Hoar frost.

f. About 7 p.m. a meteor appeared suddenly in the W, and, descending with a slight inclination to the NW, became extinct. This meteor must have been large, or but little elevated, as it was much more conspicuous in the twilight than the planet Venus.

g. a.m. Very clear atmosphere below: *Cirrus* cloud only above. This soon became *Cirrocumulus*, and p. m. came down, as before thunder, with a dull red halo round the moon. A shower, attended (it is said) with lightning, between 1 and 2 a. m.

i. Coloured *Cirrus* at sunset, and faint large lunar halo at night.

k. A thunder storm passed from W to E in the N about 2 p. m.

l. Showers, mixed with hail p. m. At sunset an extensive *blush* of rose coloured haze, spreading on the face of an opaque twilight, the clouds beneath (mostly *Cirrostratus*) at the same time rapidly dispersing.

m. Showers of hail, or rather of those hard snow balls which form its basis. A huge *Nimbus*, affording these balls, mixed with snow, passed over about sunset: after which the haze, &c. of last evening were repeated.

n. n. Showers of the kind last mentioned. Many very distinct specimens of the *Nimbus* cloud.

o. Hail has appeared occasionally in the showers for the last few days. Stormy night.

Sussex, March 28.—Between one and two o'clock the town of Horsham was visited by a storm (of thunder and hail); the tempest appeared to run in a SW direction, with a thick and gloomy atmosphere, and after many awful flashes of lightning and tremendous explosions, produced *hail* with a degree of violence that dealt destruction to the windows, &c. (The damage done to the *gardens* more especially is here noted). The hail stones were from two to three inches in circumference, and from their uneven formation appeared like rugged pieces of ice, covering the streets nearly shoe deep. The storm, though so heavy, was limited chiefly to the town.

Manchester.—The mean temperature (April) less than last month; snow and hail have fallen in small quantities. On the 13th, there was a heavy shower of hail, with a high SW wind: the hail stones were very large; the temperature during the storm was lowered 6°.—*Hanson.*

Malton.—Character of the period (April) wet, stormy, and changeable, with much hail and snow.—*Stockton.*—(ATHENÆUM).

RESULTS.

Winds Variable.

Mean height of barometer	29·81 in.
thermometer	44·01°
Evaporation	2·63 in.
Rain	0·74 in.

Character, fair and warm to the first quarter: then cold, cloudy, and unfavourable to vegetation. Rain by day 0·30, by night 0·17 in. remainder by day and night.

TABLE XXXI.

	1809.	Wind.	Pressure.		Temp.		Evap.	Rain, &c.
			Max.	Min.	Max.	Min.		
4th Mo.	New M. *a.* April 14	Var.	29·49	29·06	52°	39°	5	22
	b. 15	SW	29·49	29·07	52	39	6	26
	c. 16	W	29·11	29·87	59	39	15	66
	d. 17	NW	29·55	29·11	45	33	3	16
	e. 18	N	29·77	29·55	43	30	8	—
	f. 19	N	29·77	29·71	49	35	13	—
	g. 20	SE	29·71	29·55	46	36	5	—
	h. 21	NE	29·67	29·58	50	39	17	79
	1st Q. *i.* 22	NE	29·99	29·67	50	42	11	
	i. 23	E	30·29	29·99	46	41	5	
	i. 24	N	30·36	30·30	50	38	6	
	25	Var.	30·30	29·90	56	40	5	8
	k. 26	SW	29·90	29·69	53	47	3	12
	27	Var.	29·69	29·40	56	46	7	6
	l. 28	NE	29·64	29·40	56	40	9	11
	29	N	29·78	29·74	48	36	15	
	Full M. *m.* 30	NW	29·74	29·32	57	43	8	2
5th Mo.	May 1	NW	29·41	29·32	54	35	7	10
	n. 2	W	29·79	29·41	55	33	11	1
	3	SW			53	38	11	
	4	SW	29·89	29·86	56	45	—	—
	o. 5	Var.	30·22	29·89	57	34	23	3
	L. Q. 6	SW	30·31	30·22	63	47	12	
	p. 7	SW	30·32	30·28	68	45	13	
	8	NW	30·28	30·17	68	38	9	
	9	E	30·17	30·04	67	43	27	
	10	E	30·04	29·97	71	44	—	
	11	Var.	29·97	29·95	75	47	70	
	12	SW	29·95	29·93	78	46	25	
	q. 13	Var.	29·92	29·88	78	47	30	
			30·36	29·06	78	30	3·79	2·62

NOTES.—*a.* Thunder, with large hail, about noon.

b. Windy, showery.

c. Fair day, but with much *Cirrostratus*, and a bank of clouds in the W at sunset: very wet night.

d. Moderate rain the whole day.

e. Snow: hail at intervals: two or three *swallows* on the wing.

f. Hoar frost; steady northerly winds of late.

g. Much snow between 5 and 6 a. m.: hail at noon: steady rain an hour before sunset.

NOTES, &c. *(continued).*

h. The ground white with snow by 2 a. m. of which there fell three or four inches, followed by rain.

i. Cloudy, windy. The land bordering on the Lea is again much inundated.

k. a. m. steady rain, giving sparks *negative.*

l. The cuckoo articulates. The nightingale has sung since the 25th.

m. After a clear drying day, appear the returning indications of wind and rain. A wet night and day ensued.

n. Large hail about 11 a. m.: about 2 p. m. thunder, in a *Nimbus* bearing SW: soon after four, rain in large drops, giving sparks *negative* as did the air itself afterwards; but there was still a dense shower in the SE in which the bow appeared.

o. A faint red blush on the evening twilight, followed by hoar frost.

p. A strong but not clear twilight; very calm nights of late, with much dew.

q. At sunset a bank of rocky *Cumulus* in the NW surmounted by *Cirrus,* pointing upward.

Additional Notes, &c.—Fourth Mo. 20. *Cumulostratus* clouds p. m. inosculating with a dense continuous cloud above them. 25. Overcast a. m., a breeze with small rain: *Cirrocumulus* p. m. with *Cirrus* below it pointing downward, and succeeded by *Cirrostratus.* 26. Rain more or less all day.

Fifth Mo. 3. A weak negative electricity in a clear air. 4. Maximum of temperature at 9 a. m. windy and overcast. 12. Barometer unsteady.

On the night of the 1st of this month about 10 o'clock, a very brilliant meteor was observed from several places in the neighbourhood of Whitehaven. It is described as having an apparent diameter of five or six inches, with a tail of three feet in length.—(PUB. LEDGER).

Bath, April 26.—Seldom at this season of the year has so heavy a fall of snow been seen in this climate. The storm (on the 21st) was incessant for nearly eighteen hours, and the ground was covered upon an average to the depth of sixteen inches. In this neighbourhood trees of very considerable size were bent double, and stript of their branches by the weight, and material injury has been done to the orchards.—(ATHENÆUM).

RESULTS.

Winds Variable.

Mean height of barometer	29·83 in.
thermometer	48·58°
Evaporation	3·79 in.
Rain, &c.	2·62 in.

Of which noted by day 0·41, by night 0·72.

Meteorological Observations

MADE CHIEFLY AT

PLAISTOW, AND OTHER STATIONS,

NEAR LONDON,

IN THE YEARS

1809, 1810, 1811.

TABLE XXXII.

	1809.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
5th Mo.	New M.	May 14	E	29·92	29·81	77°	54°	23	
		15	E	29.81	29·71	68	50	8	8
		16	E	29·80	29·71	75	50	29	
		17	SE	29·80	29·76	77	57	39	
		18	SE	29·76	29·55	80	61	28	1
		19	Var.	29·74	29·51	75	53	14	25
		20	SW	29·90	29·74	64	47	12	—
		21						—	
	1st Q.	22	Var.	30·23	29·90	69	45	29	
		23	NE	30·23	30·14	69	44	27	
		24	NE	30·14	30·04	69	48	29	
		25	SE	30·04	29·89	64	50	11	
		26	SW	29·89	29·57	67	54	20	—
		27	S	29·61	29·57	70	46	22	
		28	SW	29·57	29·52	69	51	—	—
	Full M.	29	SW	29·75	29·48	66	41	38	25
		30							—
		31	S	29·80	29·45	66	49	40	—
6th Mo.		June 1	Var.	29·35	29·30	76	46	33	—
		2	SW	30·00	29·30	59	42	26	—
		3	Var.	30·00	29·64	66	50	19	7
		4	SW	29·64	29·27	67	48	18	6
	L. Q.	5	S	29·56	29·25	66	52	20	11
		6	SW	29·68	29·56	63	49	20	6
		7	SW	29·82	29·75	64	48	26	—
		8	SW	29·75	29·53	62	50	6	13
		9	W	29·56	29·54	61	46	10	4
		10	NW	29·71	29·56	64	50	12	6
		11	SW	30·05	29·71	59	48		
		12				68	53	24	
				30·23	29·25	80	41	5·83	1·12

NOTES.—Fifth Mo. 14. *Nimbi* in the W, and lightning from 10 to 11 p.m.: a small meteor. 15. a.m. thick air to the SE: a little rain: about 9 p.m. a *Nimbus* in the S, illuminated by frequent lightning: more distant lightning in the NW. 16, 17. *Cirrus* with *Cirrostratus*. 18. a.m. *Cirrocumulus*: p.m. overcast with *Cirrostratus*. 19. p.m. a most violent storm of thunder, hail, and rain, of which see the particulars at the end. 21. The cuckow very noisy at 11 at night. 31. Cloudy and windy.

Sixth Mo. 1. At night, barometer falling, wind SE, no dew: the sky overcast with clouds, among which is the *cymose*, or waved

Cirrostratus. 2. The foregoing prognostics of stormy weather have been fully verified. In the night, the wind rose and blew a tempest from SE: while it shifted to SW this morning, we had wet squalls of excessive violence: many trees have been blown down and the foliage and young fruit torn off in great quantities. 4. A rainbow at 4 a.m.: showers and wind. 5. Wet morning: stormy evening and night. 6. A brilliant bow at half past 5 p.m. squally: large *Cirri*. 7. Windy, showers: a bank of clouds in the NW at sunset. 8. Windy: a faint bow at 6 p.m. 9. Windy: a bow near sunset, and an extensive bank on the horizon. 10. Windy. 11. Calm at night.

RESULTS.

Winds Easterly in the fore part of the period, in the latter part Westerly.

Mean height of the barometer..........29·73 in.
thermometer........58·89°
Evaporation.........................5·83 in.
Rain................................1·12 in.

Account of the Hail Storm on the 19*th of Fifth Month*, 1809.

The day had been sultry like some preceding ones, and overcast with clouds, which during the afternoon gave evident demonstrations of an approaching discharge of electricity. Large and deep *Cumulostrati* were ranged side by side, mingled with the *Cirrocumulus* and *Cirrostratus*, the whole having that peculiar almost indescribable character, which these charged conductors assume, when wrought up to the highest state of *tension*. About five in the afternoon, being at the laboratory, and perceiving a continued roll of thunder, with vivid lightning approaching from the south, and the appearance of a heavy shower in that quarter, I anticipated a storm of no common violence. We were proceeding to take measures for the safety of some glass utensils, when in an instant there opened upon us a volley of hail of such tremendous force, as in ten, or at most fifteen, minutes demolished most part of the skylights and south windows in the neighbourhood. These *icy bullets*, some of them a full inch in diameter, were discharged almost horizontally from a cloud to windward, and in such quantity as to be drifted in large masses under the walls. Whether borne by the impetuous blast that came with them, or carrying the air thus before them, I could not determine, but such was the velocity of their motion that in many instances a clear round hole was left in the glass they pierced; and one large pane (which I saw) had *two such perforations* distinctly formed. The water in the river, lashed by the hail and raised by the wind, resembled a cauldron boiling violently, rather than waves with breakers. The electrical discharges were incessant, approaching with the cloud, and passing off with it: so that the whole resembled, in effect, the more mischievous artillery of human invention; inspiring, in spite of philosophical consideration, and delight at the grand and unusual phenomena, a sense of actual danger.

This sudden irruption over, it rained for a while moderately. The wind was at first E, then S during the hail, then W, then E, then W again. About seven, the clouds all at once put off their stormy character, and appeared as if going to sleep after this prodigious expenditure of power. The remainder of the evening was calm and pleasant.

A person who was on the road from London to Bow, during the storm, informed me that he experienced nothing but continued thunder and lightning, and *very heavy rain*, the latter appearing luminous on the ground on each side of him; which it often does in very heavy storms. It was evident from other circumstances that the hail was bounded in a western direction by the village of Bow: and it reached eastward from thence only about three miles. Its course appears to have been from S to N, over Blackheath, Greenwich, Blackwall, Bromley, Plaistow, West Ham, and Stratford, and so up the country between the rivers Lea and Roding, terminating probably on Epping Forest.

The damage done by the hail was very great: a London newspaper estimated it, from the accounts which reached the Editor, at 200,000 squares of glass broken in sashes, sky-lights, conservatories, hothouses, &c. besides the injury done to the crops in fields and gardens. The foliage of large elms was cut off, and scattered on the ground to a furlong's distance to leeward; and fruit trees, besides being thus stript, received wounds in their bark which were visible long after. A West-Indiaman in passing Blackwall during the storm had her fore and main-top sails blown over the side, and one man drowned. We had no account of any individual being struck by the lightning.

Great as was the disturbance of the atmospheric electricity on the above occasion it was far exceeded in France, at the same season in 1808. *Cotte*, Journal de Physique, v. 68, p. 334, has this note under May 21. "Hail storms, which ravaged twenty parishes in the department of La Loire, and fifteen in that of Lot."

On this day, I observe, the weather changed to wet at London: on the other hand, the day of our hail-storm was a wet day, with some thunder at Paris.

A letter from Palermo states, that a fall of snow had taken place in the course of the last month at *Messina*, which for several days lay on the ground to the depth of six inches, *a circumstance* (says the writer) *never before known in this country*.—(PUB. LEDGER).

Meteoric Explosions in Scotland.

A letter from Stewarton, dated July 18, says, on Tuesday the 11th current, at this place and for some miles round, a noise loud as thunder, but of much longer continuance, and very different in sound, was heard in the air.—The sky at this time was remarkably calm and serene.—The noise began with three loud distinct reports, accompanied with a kind of whizzing, resembling very much the firing of cannon. After that it was, to appearance, the rumbling of a vast heap of stones, which continued for a considerable time, and then turned to something very like the rattling of carriages: this continued so long that some people could hardly be persuaded that it was in the air—to those however who were out of their houses, the noise appeared as being almost perpendicular above their heads.—About the same time some persons are said to have seen red hot balls of fire rise, to appearance, from the earth, near Rosemount, on the road to Ayr, which after ascending entire a great height, fell in pieces into the sea, upon which a most tremendous noise immediately succeeded.—(EDINBURGH STAR).

These phenomena, compared with those which have in many instances accompanied the fall of meteoric stones, may be deemed sufficient evidence of some having fallen in the sea W of Scotland: their having appeared to " rise from the earth " is only a proof that the meteor came in a horizontal direction from the eastward.

TABLE XXXIII.

	1809.	Wind.	Pressure. Max.	Pressure. Min.	Temp. Max.	Temp. Min.	Evap.	Rain, &c.
6th Mo.	New M. June 13		30·06	29·89	71°	52°	—	
	14		29·89	29·84	69	53	24	
	15	NW	29·93	29·84	65	43	9	
	16	SW	29·93	29·77	68	51	18	
	17	W	29·78	29·73	73	52	25	
	18	NW	29·85	29·78	65	44	15	
	19	NW	29·97	29·85	72	53	14	
	1st Q. 20	NW	30·17	29·97	78	51	14	
	21		30·28	30·17	78	50	—	
	22	SE	30·28	30·25	73	50	34	
	23	E	30·30	30·22	79	52	23	
	24	NE	30·39	30·28	75	55	24	
	25	N	30·39	30·37	70	44		
	26	NE	30·39	30·16	67	43		
	Full M. 27	N			72	54		
	28	N			66	52		
	29	NE	30·03	29·99	63	48		
	30	SE	29·94	29·90	67	50		
7th Mo.	July 1	S	29·94	29·78	72	49		
	2	Var.	29·78	29·73	71	50		
	3	NW	29·74	29·49	61	47		
	L. Q. 4	Var.	29·48	29·43	60	48		
	5	N	29·51	29·50	62	52		
	6	E	29·73	29·63	68	55		
	7	N	29·75	29·74	71	60		
	8	E	29·80	29·77	74	53		
	9	NW	29·80	29·78	68	52		
	10	NW	29·98	29·82	62	50		
	11	NW	30·03	30·02	70	51		
			30·39	29·43	79	43		

NOTES.—Sixth Mo. 16—18. Windy. 19, 20. A blush on the evening twilight. 22. Cloudy, a little rain p.m.: a *Stratus* at night. 23. The same. 24. Cloudy with wind.

Seventh Mo. 1. Heavy showers a.m. 2. Very wet p.m. 3. Showery. 4. Very wet with thunder p.m. 5, 6. Showers, followed by wind. 7. Evening very stormy: lightning almost incessant, thunder distant. 8. Fair. 9. Very wet. 10. Wet a.m., fair p.m.

RESULTS.

Mean height of barometer.............. 29·92 in.
thermometer .... 59·37°

In consequence of my absence from home, the accounts of Evaporation and Rain were left imperfect. It appears by the Register of the Royal Society, that the gauge at Somerset House collected 2·53 in. of rain during this period.

Whirlwind.—July 6.—The inhabitants of Cirencester were alarmed by the appearance of a *Tornado*. It was first observed about three miles to the S of the town, where it assumed the appearance of a large conical hay-rick covered with smoke. It moved rather slowly at first towards Cirencester, throwing down many trees in the parish of Siddington. Some persons had time to get upon the tower of Preston Church to observe its course. When it approached nearer it moved with a velocity almost incredible, and making towards the bason of the Canal, where it did considerable damage, skirted the town, and entered Lord Bathurst's Park from the Tetbury road. Here its fury seemed to be at its height: for timber trees from six to ten feet in girth were torn completely up by the roots, whilst others were stript of their branches, or literally cut asunder. After crossing the park it entered an orchard, where it threw down several trees and seemed to disperse as it could no longer be traced by the eye.—(SUN PAPER).

TABLE XXXIV.

	1809.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
7th Mo.	New M. July	12	NW	30·06	30·01	75°	61°		
		13	NW	30·10	30·04	71	48		
		14	SW	30·14	30·06	73	55		
		15	NW	30·04	29·97	73	56		
		16	NW	29·93	29·81	75	41		
		17	NW	29·78	29·69	69	49		
		18	N	29·91	29·83	60	46		
		19	NW	29·99	29·99	69	53		
	1st Q.	20	NW	30·16	30·05	70	41		
		21	SE			72	50		
		22	NE	30·00	29·93	64	53		
		23	N	29·85	29·80	75	48		
		24	N	29·80	29·75	73	58		
		25	NE	29·73	29·66	81	59		
	Full M.	26	W	29·70	29·67	76	61		
		27	NW	29·67	29·62	75	61		
		28	W	29·63	29·57	70	52		
		29	SW	29·70	29·66	69	57		
		30	W	29·55	29·50	69	52		
		31	S	29·53	29·48	68	57		
8th Mo.	Aug.	1	W	29·66	29·60	71	55		
		2	W	29·68	29·51	70	56		
	L. Q.	3	S	29·35	29·31	69	49		
		4	SW	29·68	29·38	62	54		
		5	SW	29·70	29·49	65	57		
		6	S	29·34	29·24	70	55		
		7	NW	29·74	29·57	66	53		
		8	W	29·90	29·89	73	54		
		9	SE	29·88	29·83	75	53		
		10	E			82	63		
				30·16	29·24	82	41		

NOTES.—Seventh Mo. 14. Cloudy, windy. 15. A slight shower a.m. 16—19. Fair. 20. Some rain. 21—24. Fair: a *Stratus* at night the 23d. 25. A thunder storm began at one a.m. and continued till three: the lightning unusually vivid, the thunder distant. 26. Distant thunder again, with frequent lightning this evening. 28—30. Showers. 31. Fair.

Eighth Mo. 1—3. Showers. 4. Heavy rain p.m. 6. The same: rainbow twice. 7. Showers. 8, 9. Fair. 10. A storm of thunder, lightning, and heavy rain from 2 to 5 a.m.

RESULTS.

Mean height of barometer .... 29·75 in.
thermometer .... 61·95°

Rain omitted (together with the Evaporation) through my absence from home. The gauge of the Royal Society afforded 1·51 in. up to the 16th of eighth month, (when my account recommences) making 4·04 in. for the whole interval: and I found in the cistern of my own, on my return, 3·50 in. a portion (at least equal to the difference) having doubtless escaped.

Effects of Lightning.—Returning from Scotland through Newcastle-upon-Tyne, I was invited to examine the house of David Sutton, then undergoing considerable repairs from the damage done to it by a stroke of lightning, during a storm here on the third of eighth month. Out of several circumstances more usual in such cases, I selected the following as interesting:—The lightning first took (as it appears) a chimney, which it threw down, bringing a quantity of bricks and soot into a room in which a party of eight persons were at tea: *after the first explosion* a ball of fire made its appearance under the door opposite the chimney, where it remained long enough for the whole company to notice it. It then moved into the middle of the room, and separated into parts, which again exploded like the stars from a rocket. The electric fluid seems to have pervaded the whole house, and *every inch* of the bell-wires was oxidized and dispersed in beautiful mossy ramifications on the walls.

TABLE XXXV.

	1809.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
8th Mo.	New M.	Aug.	11			29·63	77°	55°		
			12		29·63	29·62	66	54		
			13		29·74	29·68				
			14							
			15							
			16							
			17	SW	29·80	29·76	79	56	20	44
	1st Q.		18	SW	29·76	29·75	71	55	17	4
			19	SW	29·92	29·76	69	55	24	
			20	S	29·88	29·78	67	55	17	6
			21	SW	29·79	29·76	65	49	8	—
			22	SW	29·79	29·57	67	49	22	5
			23	SW	29·57	29·45	67	45	17	
			24	SW	29·45	29·40	66	46	19	17
	Full M.		25	SW	29·77	29·40	66	47	3	8
			26	SW	29·72	29·67	65	51	11	—
			27	W	29·96	29·72	65	53	8	—
			28	Var.	30·06	29·96	69	54	22	
			29	S	30·06	29·83	65	47	25	
			30	N	29·80	29·67	78	61	14	5
			31	SW			65	57	—	
9th Mo.	L. Q.	Sept.	1						—	—
			2	N	29·67	29·57	72	58	31	19
			3	E	29·57	29·57	72	57	13	—
			4	E						
			5	Var.	29·57	29·48	74	57	19	32
			6	SE	29·48	29·22	70	57	14	12
			7	Var.	29·28	29·20	67	54	4	4
			8	NW	29·53	29·28	65	50	7	
					30·06	29·20	79	45	3·15	1·31

NOTES.—Eighth Mo. 17. A fine day: at sunset a dense bank of clouds in the E, low in the horizon, among which lightning played incessantly. 18. A wet morning. 20—22. Much wind. 24. Showers p.m. with a strong variable electricity: the bow appeared twice. 25. Thunder showers in various directions near us: the rod in high charge, mostly *negative:* rainbow. 26. The rod gave sparks, *positive*, without rain at the time, the sky being overcast with *Cirrus* and *Cirrostratus*. 27. A strong *positive* electricity in an atmosphere very clear below, with *Cumulus* and *Cirrocumulus*. 28, 29. The air *positive*, and serene. 30. About 5 p.m. a shower of large warm drops, strongly *negative*, heavier rain to the NE: about seven, at temperature 67°, a heavier shower, *positive*: about nine, a third charge in the rod: the bell rang much, and the pith balls with their threads showed luminous. Rain followed, with a changeable electricity, and much thunder and lightning in the W.

Ninth Mo. 5. The wind shifted during a heavy rain from E to W, the shower was once tried and found *positive*. 7. The wind veered to N by night.

RESULTS.

The Winds chiefly Westerly.

Mean height of barometer	29·66 in.
thermometer	61·15°
Evaporation (in 23 days)	3·15 in.
Rain (in the same)	1·31 in.

There was generally much dew, the frequent rains notwithstanding.

TABLE XXXVI.

	1809.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
9th Mo.	New M.	Sept. 9	W	29·63	29·53	68°	54°	13	
		10	W	29·65	29·63	63	57	8	2
		11	NW	29·76	29·65	65	53	8	
		12	SW	29·82	29·76	63	46	8	2
		13	SE	29·76	29·64	62	54	9	26
		14	NE	29·95	29·76	64	54	6	15
		15	SW	30·13	30·11	66	44	9	
	1st Q.	16	W	30·11	29·95	64	57	11	—
		17	S	29·95	29·85	63	50	7	—
		18	W	29·67	29·55	64	52	14	
		19	Var.	29·72	29·43	63	42	8	6
		20	W	29·53	29·27	67	54	21	8
		21	SW	29·81	29·57	64	52	8	17
		22	SW	29·67	29·59	69	58	19	
	Full M.	23	SW	29·80	29·67	65	50	21	5
		24	SW	29·86	29·66	58	53	11	13
		25	NW	29·95	29·80	54	38	3	27
		26	W	29·95	29·45	58	43	12	1
		27	W	28·78	29·33	65	38	10	13
		28	NW	29·94	29·87	55	35	8	8
		29	SW	29·98	29·90	55	39	8	1
		30	Var.	30·12	29·80	58	47	2	—
10th Mo.	L. Q.	Oct. 1	N			60	45	—	—
		2	SW	30·32	30·30	61	56	9	—
		3	Var.	30·22	30·17	63	55	4	
		4	E	30·17	30·05	64	40	13	
		5	E	30·05	30·04	63	48	14	
		6	E	30·04	30·02	64	45	14	
		7	NE	30·09	30·02	61	35	14	
		8	E	30·09	30·05	58	42	17	
				30·32	29·27	69	35	3·09	1·44

NOTES.—Ninth Mo. 11. Between 5 and 6 p.m. a shower from clouds formed overhead: the rain showed no electricity, but a moderate *positive* charge ensued as it ceased. 14. A hard shower, p.m. mixed with hail: at night heavy rain, with lightning in the S. 18. A blush on the evening twilight: windy. 19, 20. The same. 21. Lunar halo. 22. Stormy. 24. The moon rose clear but with a red recess (as it were) round it: the night was stormy. 25. Rain most of the day. 26—29. Hoar frosts: windy. 28. A wet squall mixed with hail p.m.: much redness, as if from elevated *Cirri* at sunset.

NOTES, &c. (*continued*).

Tenth Mo. 4. A steady breeze, E. At sunset *Cirrostratus* in the W, beautifully tinted, and in the E, much dewy haze. 5. Abundance of dew: *Gossamer*: *Cirrus*, *Cirrocumulus*. At sunset a dewy haze highly coloured in the E, succeeded by much red in the W. 7. Hoar frost, misty morning: much dew at sunset. 8. Misty: windy: *Cirrocumulus*.

RESULTS.

Winds chiefly Westerly till near the close of the period.

Mean height of the barometer	29·84 in.
of the thermometer	55·20°
Evaporation	3·09 in.
Rain	1·44 in.

Mount Vesuvius.—A letter from Naples, dated the 9th ult. gives the following account of the state of this mountain:—"After a few days of tranquillity, the eruptions of Vesuvius recommenced. On the 4th of September, a new crater opened to the south-east, much larger than that which was formed in 1807. This mouth has, since that time, constantly vomited a vast torrent of lava, which takes its direction towards the town of Torre, formerly destroyed by an eruption of the volcano. This torrent divides in two branches, and forms an island, at the extremity of which the lava unites, and produces a lake of fire, in the district of Atrio del Cavallo. No damage has yet taken place; and there is nothing to be feared, unless the torrent should change its direction, or become more impetuous. In the night of the 5th, as in the month of August 1782, Vesuvius vomited an immense quantity of ashes, stones, and smoke, forming upon the mountain a second mountain, the summit of which appeared to rise to the skies; but these substances receiving an impulsion absolutely perpendicular, have fallen into the crater, or in its neighbourhood, but have not done any injury either to the inhabitants or the houses, nearest the eruption."—(PUB. LEDGER).

Plymouth Dock, Sept. 23.—It has blown quite a hurricane for the last two nights, and about two this morning its violence considerably increased; nor is it now (5 p.m.) much abated, there is still a great surf in the Sound.—Both the last and the preceding nights, we had also an unusually heavy rain. We have scarcely had a dry day these three months.

The General Beresford, Capt. Appleby, from Honduras to Bristol, was totally lost the 21st September, in the Gulph of Florida, during a heavy gale of wind. Capt. A. writes that seven other vessels were lost there at the same time.—(PUB. LEDGER).

TABLE XXXVII.

	1809.		Wind.	Pressure,		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
10th Mo.	New M.	Oct. 9	NE	30·05	30·02	52°	35°	20	
		10	NE	30·01	30·00	50	40	27	
		11	NE	30·10	29·99	52	37	—	
		12	NE	30·19	30·05	51	31	38	
		13	E	30·27	30·19	51	29	—	
		14	NW	30·33	30·27	55	27	—	
		15	NW	30·27	30·10	52	32	18	
	1st Q.	16	SW	30·10	30·07	56	48	0	—
		17	SW	30.07	30·05	60	52	10	7
		18	W	30·13	30·06	58	54	—	
		19	W	30·15	30·12	58	52	15	—
		20	SW	30·12	30·10	54	50	2	
		21	S	30·08	30·06	55	50	5	
		22	Var.	30·06	29·98	54	49	4	
	Full M.	23	SE	29·98	29·89	55	46	—	
		24	SW	30·10	29·89		47	—	
		25	Var.	30·27	30·10	64	48	31	
		26	NE	30·27	30·25	67	49	4	2
		27	NW	30.26	30·22	63	46	2	2
		28	S	30·26	30·24	54	45	0	3
		29						0	—
		30	NE	30·24	30·07	53	45	1	3
	L. Q.	31	N	30·05	30·02	52	39	1	1
11th Mo.		Nov. 1	N	30·20	30·11	53	41	7	
		2	N	30·11	30·10	50	37	8	
		3	N	30·10	29·89	47	41	8	7
		4	NE	29·84	29·76	46	37	1	26
		5	NE	29·90	29·84	44	36	1	12
		6	NE	30·05	29·84	46	36	2	2
				30·33	29·76	67	27	2·05	0·65

NOTES.—Tenth Mo. 9—12. Fine. 13. Foggy morning: hoar frost. 14. Hoar frost. 15. Cloudy; very misty night. 16. Cloudy. 17. Overcast by *Cirrostratus*, which was coloured by the setting sun: after which, rain towards morning. 18—22. Cloudy. 23. A *Stratus* at night. 24. Clear; much wind at night. Misty mornings have been frequent for two weeks past. 27. Wind N a.m., W evening, with much mist.

Eleventh Mo. 1. Misty morning: very fine day. 2. Fine clear morning. 3—6. Rain.

Notes, &c. *(continued)*.

RESULTS.

Prevailing Wind Northerly.

Mean height of the barometer	30·08 in.
thermometer	47·74°
Evaporation	2·05 in.
Rain	0·65 in.

The rain of the 17th, which fell in the midst of a month of fine weather, was probably the effect of a southerly current. The barometer had not fallen three-tenths, and it was high at the time: but the mean temperature on the preceding day had risen 10°, after two or three frosts, and the evaporation was quite suspended. The products of the rain gauge from the 26th to the 31st inclusive were *wholly derived from copious mists and dews.* The latter part of the tenth month appears by the papers to have been stormy in the West Indies: a heavy gale of wind at Martinique, at least, is particularly mentioned.

On the 25th of tenth month my friend Thos. Forster, found by means of a small balloon sent up from Clapton about 2 p. m., that there prevailed on that afternoon no less than *four* different currents in the atmosphere, at different heights, in the following order, beginning from the lowest: ESE, N, SW, SSE. The wind below was variable and very gentle, and there were a few clouds in the sky, of the modification *Cirrus.* He found by similar means, on the following day, *three* currents, *viz.* ENE, a little above, SE, and lastly, SSW.

Lisbon, Oct. 27.—On the 25th of this month, at fifty minutes past nine o'clock at night, the shock of an earthquake was felt. The people of this city, who have not forgotten the fatal catastrophe of the 1st of Nov. 1755, were greatly alarmed, and with reason. It lasted but an instant, and did no damage. Some persons say, that they felt another about two the next morning; but this is not generally believed, as fear will sometimes produce that effect on the imagination.—(Papers).

TABLE XXXVIII.

	1809.		Wind.	Pressure. Max.	Pressure. Min.	Temp. Max.	Temp. Min.	Evap.	Rain, &c.
11th Mo.	New M.	Nov. 7	NW	30·42	30·05	52°	36°	3	
		8	NE	30·43	30·41	47	41	2	
		9	N	30·41	30·32	49	45	—	
		10	SE	30·32	30·12	50	42	25	
		11		30·12				—	
		12	SW		29·74	46	41	7	3
		13	NW	29·77	29·72	47	32	1	
	1st Q.	14	N	29·69	29·64	46	35	6	17
		15	N	29·72	29·68	40	28	—	
		16	NW	29·75	29·50	39	27	17	—
		17	W	29·72	29·44	46	27	—	—
		18	N	30·27	29·72	38	29	—	—
		19	NW	30·47	30·27	38	22	—	
		20	NW	30·30	30·24	38	26	—	
		21	W	30·30	30·12	42	30	—	
	Full M.	22	W	30·12	30·04	51	37	19	1
		23	SW	30·04	29·37	49	41	—	35
		24	NW	29·76	29·37	44	34	7	1
		25	SW	29·76	29·10	45	36	5	1
		26	NW	29·63	29·10	45	26	—	
		27	NW	29·95	29·63	41	27	—	—
		28	W	29·95	29·88	39	33	4	1
		29	SW	29·88	29·85	40	31	—	
	L. Q.	30	SW	29·30	29·25	47	32	4	32
12th Mo.		Dec. 1	W	29·60	29·30	44	36	7	4
		2	W	29·92	29·60	43	31	—	
		3	SW	29·60	29·50	50	37	10	3
		4	NW	29·90	29·43	49	35	5	3
		5	SW	30·11	30·00	46	34	6	
		6	SW	30·00	29·82	54	47	6	
				30·47	29·10	54	22	1·34	1·01

NOTES.—Eleventh Mo. 8—13. Misty mornings. 14. The same: rain at night. 17. Snow early, preceded by much redness at sunset: wind very boisterous during the day, with showers. 18. p. m. The ground covered by several snow showers. 19. Hoar frost. 22. Misty morning: wind. 23. A stormy night. 24. Hoar frost. 25. Wind in the night. 26. Morning overcast: day pretty fine. 27. A very white frost on the ground. 28. Misty day. 29, 30. Misty mornings, the latter a stormy night.

(NOTES, &c. continued.)

Twelfth Mo. 1, 2. Much wind by night. 3. *Cirrostratus* a. m. with a turbid sky. 5. Hoar frost: windy night. 6. Cloudy, windy: the maximum temperature at 9 a. m.: a brisk gale all night.

RESULTS.

Prevailing Winds Westerly.

Mean height of the barometer	29·86 in.
thermometer	39·32°
Evaporation	1·34 in.
Rain	1·01 in.

Dover, Nov. 27.—It has blown very hard, and several ships have gone past into the Downs with damage.—(PUB. LEDGER).

TABLE XXXIX.

	1809.		Wind.	Pressure.		Temp.	
				Max.	Min.	Max.	Min.
12th Mo.	New M.	Dec. 7	SW	30·25	29·82	54°	35
		8	SW	29·82	29·65	48	37
		9	SW	29·65	29·15	53	42
		10	SW	29·30	29·10	49	37
		11	SW	29·45	28·94	46	36
		12	SW	29·20	29·05	48	36
	1st Q.	13	SW	29·40	29·20	43	30
		14	SE	29·20	28·70	44	33
		15	S	28·83	28·70	41	32
		16	SE	28·80	28·68	40	31
		17	SW	28·38	28·25!	44	34
		18	W	29·22	28·25	42	39
		19	NW	29·73	29·22	44	34
		20	SW	29·74	29·60	43	32
	Full M.	21	NW	29·95	29·74	44	32
		22	W	29·95	29·90	44	35
		23	Var.	29·93	29·84	37	28
		24	SW	30·05	30·00	36	28
		25	Var.	30·05	29·77	43	35
		26	Var.	29·83	29·74	43	38
		27	W	30·10	29·83	41	34
		28	SW	30·10	29·75	45	3[illegible]
				30·25	28·25	54	2[illegible]

Notes.—Twelfth Mo. 8. Misty: very slight hoar
night. 9. Misty a. m., stormy night: the barometer h
lower and was found rising. 10. The day pretty cal
windy. 11. A lunar halo, large and faint: at night t
again and blew very hard till morning, with rain. 1
11 a. m. with rain and some hail. 13. At 8 a. m. several
S; hoar frost: about 1 p. m. a squall with rain and ha
frost, misty: at evening a large lunar halo: the fore par
a violent storm from the SE. 15. a. m. calm with *Nimb*
frost, calm and cloudy, with *Cirrostratus* and *Nimbus*
halo just perceptible: rather windy night. 17. The
then strong, but on the whole moderate by day: the nig
very wet. 18. a. m. very dark with clouds. The baro
steady, having thrice changed its direction since last
19. Windy. 20. a. m. calm and cloud
with rain. 21. Hoar frost, with fr

[illegible]

ning I observed
°, with a breeze
ong. 16. Wind
stallized in stars.
night. 18. Hail
with much rime
hough mist and
ded in rime, are
ent down to 21°,
: up at NE, with
a little rain and
7. Misty.

y and Easterly.
30·36 in.
29·50 in.
. 30·07 in.
. 51°
. 10°
. 36·43°
. 1·21 in.
. 0·12 in.

Moscow was in the
air in a cup was
l.—(Pub. Ledger).
40° of Fahrenheit:
, ere the quicksilver
. The date by our
month, and probably

NOTES, &c. *(continued)*.

Plymouth, Dec. 16.—Wind SW. The violence of the wind on Thursday night has seldom been exceeded, even in this place, which is exposed to the furious blasts of the Atlantic. It suddenly veered round to the SE, and threw such a tremendous swell into the Bay, that the Temeraire was for some time in great danger of foundering.—(PUB. LEDGER).

Greenock, Dec. 18,—The Argus, Fortune, from Le Have, in Nova Scotia, arrived at the Tail of the Bank on Saturday morning last, after a passage of 32 days, during a great part of which she experienced very heavy gales of wind.—(PUB. LEDGER).

Torbay, Dec. 18.—It has blown quite a hurricane from the S and W the whole of the last week.—(PUB. LEDGER).

Plymouth, Dec. 18.—We are still visited by the same severe blowing weather latterly noticed. The wind has now shifted to the north, and seems inclinable to veer round to the eastward.—(PUB. LEDGER).

Deal, Dec. 18.—It blew very hard last night, and early this morning, from the S, and SSW.—(PUB. LEDGER).

Whitehaven, Dec. 19.—We have had nearly a week of the most stormy and tempestuous weather that can be imagined, particularly on Friday morning, when there was a most violent gale of wind from the southward, accompanied with hail and sleet, which was followed by a very heavy rain. On Friday evening, there was a very awful storm of thunder and lightning, such as, perhaps, was never witnessed here at this season of the year; the latter was uncommonly vivid, and the peals of thunder were exceedingly loud, and in rapid succession. It continued, with little intermission, the whole night. Several chimnies have been blown down, roofs damaged, &c. We learn, that a great deal of snow has fallen in the interior of the country. It is said to be lying in drifts of nine feet deep in some places on the east side of this county, and the adjoining part of Northumberland.—(PUB. LEDGER).

The Meteor called Falling Stars in connexion with an Earthquake.

Cape of Good Hope, Dec. 8, 1809.—On the 5th instant we were still in a state of alarm, on account of the earthquake the night before at half-past ten: we had three successive shocks of a tremendous nature, accompanied by a most awful sound. The whole lasted about three minutes, with an interval of hardly two seconds between each shock. During all the time there was a serene sky: the stars shone bright, but we observed *an uncommon number of stars falling*.—(TIMES).

THE PRESENT PERIOD terminates, as the Reader will probably have remarked, at the end of three weeks, instead of the lunar month as usual. The reason is, that I here determined on the adoption of a new period, beginning with the Moon's last quarter, which I found to be more convenient for investigating the variations of the Barometer and Thermometer, as affected by the two principal changes in the position of that planet with regard to the Sun and the Earth: and of which I may have occasion to treat hereafter. *This period I have used in my Tables ever since.*

Having ceased to publish my Observations when the ATHENÆUM was discontinued at Midsummer, 1809, I did not resume the printing of them for three years. In this interval, from causes which it is not important to mention, they were more than once interrupted; and as it will be found in the conclusion of this work, that a continuity of Observations in the same neighbourhood is of greater importance than I then supposed, I have endeavoured to supply the deficiencies in the following manner. I take the variations of the Barometer for a part of the years 1810 and 1811, with remarks on the clouds and state of the sky, from the Register of my friend *Thos. Forster, junior*, of Clapton. His notes will be found to contain much curious matter. With respect to his Barometer I find it to range about *a tenth of an inch higher* than my own, instead of as much lower, which it would have done, from the higher level of Clapton, had the two been adjusted: notwithstanding which I prefer its results to those of the Barometer then used at the Laboratory. The Observations of my partner *John Gibson*, at the latter station, in great measure supply the materials for the remainder of the deficient Tables. I shall distinguish the Notes from each other by affixing the initials of their respective authors.

TABLE XL.

	1809.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
12th Mo.	L. Q.	Dec. 29	NW	29·70	29·50	49°	41°	9	6
		30	W	29·86	29·68	50	41	8	
1810.		31	SW	30·09	29·98	51	45	7	
1st Mo.		Jan. 1	SW	30·22	30·09	51	45	5	
		2	S	30·22	30·10	45	40	3	
		3	SW	30·25	30·10	50	43	3	
		4	S	30·34	30·25	50	44	4	3
	New M.	5	SE	30·30	30·25	47	44	5	
		6	SW	30·31	30·22	49	42	4	
		7	S	30·22	30·00	43	37	3	
		8	SE	30·00	29·85	46	39	1	—
		9	S	29·95	29·65	48	42	—	—
		10	SE	29·98	29·90	43	41	6	
		11	SE	29·90	29·87	46	42	5	—
		12	E	29·94	29·87	44	32	14	—
	1st Q.	13	E	30·03	30·01	33	27	—	
		14	NE	30·01	29·89	30	24	—	—
		15	N	29·89	29·78	28	16	—	—
		16	NW	30·02	29·78	28	10	—	—
		17	SE	30·26	30·02	31	14	—	—
		18	Var.	30·28	30·25	36	20	—	—
		19	E	30·25	30·19	31	14	—	—
	Full M.	20	NE	30·19	30·05	29	21	—	—
		21	E	30·05	29·97	36	30	—	—
		22	E	30·09	29·95	33	32	35	—
		23	N	30·22	30·09	37	33	1	3
		24	Var.	30·31	30·20	38	33	3	
		25	NE	30·36	30·31	38	31	—	
		26	E	30·31	30·26	36	31	—	
		27	NW	30·26	30·22	31	30	5	
				30·36	29·50	51	10	1·21	0·12

NOTES.—Twelfth Mo. 29. Much wind in the night. 30. The same. 31. Windy, overcast.

1810. First Mo. 1, 2. Windy, cloudy. 4. *Cirrostratus*, *Cirrocumulus*. 5. Fine grey morning: p. m. with the wind SE. *Cirri* pointing upward and westward: after which much loose *Cumulus*, 6 a. m. wind SW: pretty clear. 7. Grey morning. 8. a. m. quite overcast: a little drizzling from SE. 9. Very cloudy a. m. the wind rising at S, with some rain. 11. Fair, though cloudy. 12. Overcast, drizzling: a breeze at E, which increased at night to a strong wind; this continued till the next evening, the evaporation being more than double in consequence. 14. Snow, a. m. from NE. In the evening I observed wild ducks migrating to the W, the temperature 22°, with a breeze at N. The wind then passed to W, and blew strong. 16. Wind a. m. SW. Snow at intervals most of the day, cristallized in stars. 17. Much rime on the trees a. m., a little snow in the night. 18. Hail balls a. m., snow at intervals. 19. At night misty, with much rime and some hail balls. 20. A very clear day with us, though mist and smoke prevailed to the S: the trees, being quite shrouded in rime, are extremely beautiful. After sunset the temperature went down to 21°, then rose again by 10 p. m. to 26°, the wind springing up at NE, with cloudiness. 21, 22. Snow in stars. 23. Misty a. m., a little rain and sleet p. m. 24. Very cloudy: small rain. 25, 26, 27. Misty.

RESULTS.

Winds Westerly in the forepart, afterwards Northerly and Easterly.

Barometer:	Greatest height	30·36 in.
	Least	29·50 in.
	Mean of the barometer	30·07 in.
Thermometer:	Greatest height	51°
	Least	10°
	Mean of the thermometer	36·43°
Evaporation		1·21 in.
Rain		0·12 in.

February 19, 1810.—The greatest cold last winter at Moscow was in the night of January 11, when mercury exposed to the open air in a cup was frozen so hard, that it could be cut with shears, and even filed.—(PUB. LEDGER).

This effect requires a temperature considerably below − 40° of Fahrenheit: indeed the thermometer is said to have been seen at − 44°, ere the quicksilver made its final sudden retreat into the bulb by congealing. The date by our style (if not already corrected) would be the 23d of the month, and probably 1809.

TABLE XLI.

	1810.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
1st Mo.	L. Q.	Jan.	28	NW	30·32	30·22	31°	30°	—	
			29	E	30·48	30·32	34	31	—	
			30	Var.	30·48	30·39	32	30	—	
			31	SW	30·39	30·16	47	30	7	5
2d Mo.		Feb.	1	SW	30·16	30·08	50	47	—	—
			2	Var.	30·08	29·77	47	42	4	18
			3	Var.	29·87	29·68	46	42	1	3
	New M.		4	NW	30·07	29·87	45	30	—	
			5	SW	30·07	30·03	48	30	10	
			6	SW	30·03	29·95	47	41	5	—
			7	S	29·96	29·93	49	44	4	—
			8	SE	29·93	29·82	48	42	5	2
			9	SW	29·76	29·73	47	42	3	—
			10	NW	29·85	29·76	54	42	6	2
	1st Q.		11	E	29·76	29·40	43	39	—	17
			12	SW	29·40	29·04	43	36	3	23
			13	SW	29·28	28·98	45	33	1	11
			14	NE	29·67	29·28	43	33	18	—
			15	NW	30·08	29·67	39	23	—	
			16	N	30·12	30·08	41	25	—	—
			17	N	30·22	30·18	38	22	—	
			18	SW	29·98	29·84	34	26	—	—
	Full M.		19	N	30·24	29·98	35	23	—	—
			20	NW	30·49	30·24	33	11	—	—
			21	Var.	30·50	30·30	32	14	—	
			22	SW	30·30	29·50	36	29	—	—
			23	SW	29·54	29·40	45	36	—	—
			24	SW	29·48	29·45	50	43	—	10
			25	W	29·91	29·48	50	35	40?	1
					30·50	28·98	50	11	1·07	0·92

NOTES.—First Mo. 28. In the evening some lightning in the NE: very calm: sleet. 29. Grey morning: calm: barometer fluctuates, scarce any sun for a week past. 31. The wind changing to SW with rain, a period was put the continued stagnation of temperature about the freezing point; which, with cloud and calm, has obtained ever since the full moon.

Second Mo. 3. A breeze at N a. m. 7. A little rain a. m. 10. The wind shifting suddenly to NW, brought the smoke of the city over us in the unusual form of a dense *elevated cloud*, with a clear space below: a little rain, and *Cumulostratus* followed. 11. Wind pretty strong:

cloudy and drizzling. 12. Very misty. The barometer has fallen 0·96 in. with a steady wind at E. The night was windy at SW, with some snow afterwards. 13. Squally. 15. A little snow: a lunar corona. 16. Hoar frost: some snow in the night: the moon showed of a *golden* colour. 17. Very fine day: large *Cumuli*: the moon *pale* at night, with a purplish colour round it. 18. Overcast a.m., much snow p.m., a slight thaw. 19. Clear morning, snowy evening. About nine, at the breaking of the clouds, the sky presented a fine spectacle. For some space around the full moon, it was of the usual lively grey: next to this appeared a pink, or pale rose colour, deepening as it receded towards the horizon. Against this unusual ground the silver lights, common to the broken *Cumuli*, were degraded to a cream colour, not less beautiful: and as any of these passed under the moon, they presented iridescent *spectra*, in which the red and blue were uncommonly vivid and distinct. These appearances were doubtless owing to the presence of an unusual quantity of frozen haze, out of which the snow was all the while forming. 20. About 11 a.m. a pinky haze appeared in a snow storm under the sun, as before under the moon. 27. A fine day. 28. Windy night.

RESULTS.

Winds Variable, but for the most part Westerly.

Barometer:	Greatest height	30·50 in.
	Least	28·98 in.
	Mean of the period	29·91 in.
Thermometer:	Greatest height	50°
	Least	11°
	Mean of the period	37·63°
Evaporation		1·07 in.
Rain		0·92 in.

TABLE XLII.

	1810.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
2d Mo.	L. Q.	Feb. 26		29·88	29·78	49°	42°	—	—
		27		30·01	29·72	54	47	17	—
3d Mo.		28	SW	30·01	29·86	56	39	11	—
		March 1	SW	29·86	29·69	54	51	7	—
		2	W	29·69	29·57	54	44	1	5
		3	SW	29·68	29·54	54	32	3	10
		4	Var.	29·54	29·24	50	40	1	22
	New M.	5	Var.	29·24	28·92	46	31	4	36
		6	SW	28·92	28·81			—	—
		7	SW	28·96	28·81	48	36	8	14
		8	S	29·11	28·96	54	46	8	5
		9	SW	29·36	29·11	58	50	1	19
		10	SW	29·90	29·36	60	46	—	
		11	SW	29·90	29·68	57	50	24	48
		12	Var.	30·00	29·68	56	48	—	—
	1st Q.	13	NE	30·00	29·95	48	38	13	—
		14	E	30·02	29·86	42	32	20	
		15	E	29·86	29·57	40	34	—	
		16	E	29·66	29·57	40	35	—	
		17	NE	29·89	29·66	43	30	44	
		18	E	29·95	29·89	45	24	—	
		19	SE	30·04	29·95	47	28	—	
		20	N	29·95	29·80	50	31	—	
	Full M.	21	N	29·93	29·70	50	31	28	
		22	NE	30·17	29·95	45	27	—	
		23	NE	29·95	29·76	52	26	—	
		24	E	29·80	29·76	50	35	44	
		25	E	29·92	29·84	41	33	53?	
		26	E	29·92	29·77	43	34	19	
		27	SW	29·66	29·61	55	42	9	10?
				30·17	28·81	60	24	3·15	1·69

Notes.—Third Mo. 1. Misty, drizzling. 2. Cloudy. 3. Much drizzling rain p. m. 4. Wet night. 5. Snowy forenoon. 7. The Lea has risen over its banks. 9. A heavy squall about 1 p. m., with rain: a stormy night: much water out. 11, 13, 14. Windy: cloudy. On the latter evening a remarkable lunar halo. A circle of *white* surrounded the moon at a considerable distance, which was well defined on the inner side, so as to make the included space appear dark, while on the outer it faded insensibly into the colour of the sky. 15. A little snow a. m. 17—20. Hoar frosts. In the day time, during

NOTES, &c. *(continued).*

this interval the *Cumulus* appeared, passing to *Cumulostratus*, and evaporating at evening. 21. Much wind at times in the night. 22, 23. Hoar frosts. 24, 25. The deposition of dew suspended. 26. A moderate gale at E, as yesterday. 27. Cloudy a. m., a breeze at SE: wet p. m.: night windy, SW. The rain is put down by estimate.

RESULTS.

Winds Westerly in the forepart with rain, afterwards Easterly with a dry atmosphere.

Barometer:	Greatest height	30·17 in.
	Least	28·81 in.
	Mean of the period	29·67 in.
Thermometer:	Greatest height	60°
	Least	24°
	Mean of the period	42·08°
Evaporation		3·15 in.
Rain		1·69 in.

A Friend who went from our neighbourhood to reside this winter at Cowley Bridge, near *Exeter*, has favoured me with the following Observations made there with a Six's Thermometer, during the Second month. The place is two miles and a half above the city, on the bank of the Ex.

1810.	Max.	Min.	1810.	Max.	Min.
2d Mo. Feb. 1	54°	46°	2d Mo. Feb. 15	34°	18°
2	51	44	16	35	29
3	46	40	17	34	18
4	45	27	18	39	31
5	45	29	19	36	33
6	52	42	20	36	17
7	51	35	21	34	25
8	51	38	22	45	30
9	55	38	23	50	44
10	55	38	24	54	47
11			25	52	34
12	44	43	26	53	45
13	44	38	27	57	42
14	45	32	28	58	45

The mean temperature of this month near Exeter, appears by the above observations to have been 40°, while with us it was 39°—the extremes, 58° and 17°, with us 56° and 11°.

Portsmouth, March 25.—Wind Easterly. It has blown very hard all day, and still continues.

Deal, March 25.—Wind NE, blows hard.—(PUB. LEDGER).

TABLE XLIII.

	1810.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
3d Mo.	L. Q.	March 28	W	29·90	29·66	52°	36°	22	
		29	Var.	29·92	29·88	55	35	10	
		30	SW	29·88	29·75	51	41	6	7
		31	S	29·75	29·42	52	41	—	4
4th Mo.		April 1	E	29·69	29·42	52	42	12	17
		2	SE	29·73	29·60	52	40	6	2
		3	SW	29·40	29·35	58	41	7	7
	New M.	4	W	29·70	29·40	50	34	9	
		5	SW	29·70	29·36	54	42	12	
		6	SE	29·36	29·30	48	41	7	2
		7	SE	29·45	29·30	52	41	6	
		8	E	29·47	29·45	56	42	15	10
		9	E	29·50	29·40	53	43	8	35
		10	NE	29·65	29·50	45	34	7	.14
	1st Q.	11	NE	29·90	29·65	43	33	—	—
		12	NE	29·92	29·88	42	30	—	
		13	Var.	29·92	29·86	42	33	26	—
		14	SW	29·86	29·82	48	35	8	
		15	SW	29·82	29·57	52	33	17	
		16	Var.	29·50	29·37	52	36	12	10
		17	SW	29·60	29·54	56	41	—	
		18	S	29·72	29·54	60	43	33	
	Full M.	19	S	29·90	29·72	61	47		
		20	NE	30·12	30·07	63	44		
		21	W	30·12	30·12	61	43		
		22	W	30·12	30·12	66	45		
		23	E	30·18	30·12	71	46		
		24	E	30·18	30·13	74	37		
		25	NE			65	41		
				30·18	29·30	74	30	2·23	1·08

NOTES.—Third Mo. 28. A little rain. 29. A shower mixed with hail about noon.

Fourth Mo. 3, 4. Cloudy: much wind. 5. A fine day: 6 a. m. much wind and cloud from the S. 7. The trees dripping, as from a mist this morning. 8. Windy. *Cumulostratus* was formed by inosculation, and passed to Nimbus. 9. Windy, cloudy: steady rain p. m. 10. A stormy wet day. 11. Snow in small quantity. Hail mixed with rain at intervals. 13. A little snow and some hail balls. 18. A single swallow: bats on the wing: stormy indications p. m. Some very faint coruscations in the W and NW last night. 19—25. Fine days.

RESULTS.

Wind Variable, with a large proportion of Easterly.

Barometer:	Greatest height	30·18 in.
	Least	29·30 in.
	Mean of the period	29.89 in.
Thermometer:	Greatest height	74°
	Least	30°
	Mean of the period	47°
Evaporation (in 22 days)		2·23 in.
Rain		1·08 in.

TABLE XLIV.

	1810.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
4th Mo.	L. Q.	April 26	E	30·08	30·00	64°	42°	26	
		27	E	30·09	30·05	60	35	42	
		28	E	30·09	30·05	67	34	30	
		29	NE	30·05	29·96	72	37	33	
		30	NE	29·96	29·85	75	37	36	
5th Mo.		May 1	NW	29·85	29·83	67	42	30	2
		2	NE	29·83	29·71	57	39	7	
	New M.	3	NW	29·73	29·70	58	35	8	
		4	Var.	29·80	29·70	53	36		
		5	NE	29·85	29·80	53	37		
		6	NE	29·80	29·78	52	32		
		7	NE	29·78	29·45	51	38		
		8	SW	29·67	29·41	53	46		
		9	S	29·81	29·75	63	40		
		10	W	30·02	29·90	63	47		
	1st Q.	11	E	30·07	30·02	66	56		
		12	NE	30·02	29·92	58	41		
		13	NE	29·92	29·80	61	52		
		14	NE	29·80	29·48	63	47		
		15	Var.	29·48	29·30	62	48		
		16	NW	29·41	29·38	55	50		
		17	S	29·41	29·39	63	51		
		18	E	29·65	29·41	49	35		
	Full M.	19	SE	29·96	29·65	50	35		
		20	SE	29·95	29·80	63	34		
		21	SW	29·80	29·58	61	45		
		22	Var.	29·88	29·80	63	42		
		23	NW	30·06	29·88	60	36		
		24	NW	30·15	30·06	63	37		
				30·15	29·30	75	32		

NOTES.—Fourth Mo. 26—30. Clear days with dew and hoar frost: a strong breeze on the 27th, whence so great an evaporation.

Fifth Mo. 1. Wind N at intervals: no dew. 2. Cloudy morning: in the evening *Cirrocumulus*, which changed to *Cirrostratus*, 3. At 5 a. m. the same modification, and about 8, a refreshing rain. 5, 6. Fair. 7. Dripping. 8. Showers. 9. Cloudy. 10. Little rain. 11, 12. Fair. 13. Dripping. 14. Windy. 15. Rain in the night. 16. Rain a. m. 17, 18. Wet. 19, 20. Fine. 21. Wind and some rain. 22—24. Fine.

NOTES, &c. *(continued).*

RESULTS.

Winds chiefly Easterly.

Barometer:	Greatest height	30·15 in.
	Least	29·30 in.
	Mean of the period	29·80 in.
Thermometer:	Greatest height	75°
	Least	32°
	Mean of the period	50·53°

Having been during part of this period at the coast on account of indisposition, the Observations on the Barometer and Thermometer were continued by my son: a few omissions are supplied from those made at Stratford. The Evaporation and Rain were not registered further.

A *Whitehaven* Paper of the 11th says: the weather for some days past has been the coldest ever remembered at this season of the year; there has been a sharp frost every night—the Isle of Man and the Scotch hills are covered with snow: some vessels had six inches of snow upon their decks.

At *Manchester* on the morning of the 5th, the temperature was 27°, and on the two following days there were slight falls of snow, with a high wind at N. On the 8th, frequent heavy showers of hail, wind NE.—*Hanson.*

At *Malton*, the wind in May was N, NE, or E, for twenty days, and the mean heat of the month 47°.—*Stockton.*

The Papers make mention of hail storms in the west of France, on the 18th and 19th of this month, which were very destructive to the corn and vines; more especially in a district about *Nerac*, where "people who were in the fields were obliged to fly, covered with contusions, to whatever shelter they could find, and numbers of birds and poultry were found dead:" in another place, "some of the hail stones were as large as a goose's egg; and every pane of glass exposed to the storm was broken."

TABLE XLV.

	1810.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
5th Mo.	L. Q.	May 25	N	30·18	30·10	70°	36°		
		26	NE	30·08	30·00	73	37		
		27	NE	30·00	29·98	68	46		
		28	N	30·29	30·10	63	32		
		29	E	30·41	30·40	69	34		
		30	E	30·41	30·36	69	40		
		31	E	30·37	30·35	74	42		
6th Mo.		June 1	E	30·40	30·30	74	40		
	New M.	2	E	30·29	30·27	79	42		
		3	NE	30·31	30·29	72	39		
		4	Var.	30·30	30·25	76	44		
		5	NE	30·30	30·29	58	45		
		6	Var.	30·28	30·28	72	53		
		7	Var.	30·18	30·15	74	49		
		8	Var.	30·14	30·07	78	55		
		9	Var.	30·01	29·95	79	57		
	1st Q.	10	Var.	30·00	29·95	72	45		
		11	NW	30·00	29·95	66	52		
		12	W	30·00	29·92	67	51		
		13	W	30·00	29·92	66	43		
		14	NW	30·21	30·13	63	44		
		15	NW	30·29	30·19	70	39		
	Full M.	16	NE	30·00	29·90	66	37		
		17	N	30·00	30·00	70	40		
		18	W	30·00	30·00	73	55		
		19	W	30·00	29·98	71	58		
		20	SW	30·20	30·00	73	55		
		21	W	30·20	30·20	76	61		
				30·41	29·90	79	32		

Notes J. G.—*May* 27. A shower in the evening. 28. A thunder storm at night, the wind SE, lightning nearly incessant and vivid: some heavy showers. 29. Considerable rain p. m.

June 4. Wind NE about nine: in the course of the day it shifted round against the sun, fixing in the NE in the evening. 10. A slight shower a. m., distant thunder p. m. 13. Some refreshing showers in the course of the day. 18. Lunar halo. 20. Showers p. m.

Notes T. F.—*June* 2. *Cirrus*, *Cirrostratus*, and fleecy *Cumulus* observed. The *Cirrostratus* in particular was highly coloured. 3. Small meteors, usually called falling stars, seen this evening.

NOTES, &c. (*continued*).

4. *Cirrostratus*. 5. Black clouds which threaten rain. 7. Distances very hazy. 13. *Cirrostrati* early this morning. 17. *Cirri* early. About 5 p. m. I observed the modification of *Cirrostratus* approximating to *Cirrocumulus*, and disposed in long arcs extending from N to S, passing on gently with the wind. 18. Towards evening, an apparent confusion of the electrical state of the two sheets of clouds took place, which threatened rain.

The weather has been so dry for the last three weeks, that all my hygrometers have ceased to be of any use.

RESULTS.

Winds Easterly in the fore part, with dry weather; Westerly with some showers, towards the end.

Barometer:	Greatest height	30·41 in.
	Least	29·90 in.
	Mean	30·14 in.
Thermometer:	Greatest height	79°
	Least	32°
	Mean	54·20°

The case of a house struck by lightning at East Thriston, (see the note) suggests *two precautions* in a time of thunder storms—not to suffer loaded fire-arms to be about, as the least spark of electricity reaching the powder will cause it to explode—and, on having reason to suppose that any part of a building has been struck, immediately to see that no combustible matter has been kindled by the iron, which may have conducted the electric fluid, and in so doing have been heated or even melted.

June 4.—In a tremendous storm of thunder and lightning, the electrical fluid entered the house of Mr. Cowens, farmer, at East Thriston, shivered to pieces a press-bedstead in the kitchen, ran along and melted the bell-wires attached to three rooms; in the parlour a closet-door was split. At this moment Mr. Cowens came in, and his dog, which was close behind him, was killed; *a loaded gun in the passage exploded soon after*. When the alarm had a little subsided, it was discovered that the rooms on the second floor were on fire, the lightning *having set fire to the curtains and bed-hangings*; the flames were, however, soon happily extinguished. In the staircase window, which fronts the east, there is only one pane of glass left whole.—(PUB. LEDGER).

TABLE XLVI.

	1810.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
6th Mo.	L. Q.	June	22	Var.	30·20	30·20	74°	48°		
			23	SE	30·40	30·20	75	44		
			24	SE	30·20	30·20	81	50		
			25	NE	30·20	30·11	83	57		
			26	N	30·11	30·04	60	49		
			27	NW	30·04	30·00	67	47		
			28	E	30·06	30·05	74	55		
			29	SE	30·10	30·04	75	50		
			30	Var.	30·18	30·14	75	50		
7th Mo.	New M.	July	1	Var.	30·18	30·14	76	59	14	20
			2	W	29·85	29·84	76	56	30	
			3	S	29·79	29·44	70	53	11	24
			4	SW	29·64	29·44	62	51	09	22
			5	Var.	29·91	29·81	69	58	10	
			6	W	30·05	29·95	72	49	14	
			7	SW	30·05	30·02	79	52	23	
	1st Q.		8	Var.	29·90	29·88	73	52	09	17
			9	W	29·99	29·86	72	59	24	05
			10	SW	29·80	29·79	75	48	19	—
			11	Var.	29·69	29·55	81	59	—	—
			12	W	29·69	29·61	74	59	36	42
			13	S	29·69	29·65	74	55	29	
	Full M.		14	SW	29·91	29·75	67	50	13	34
			15	N	30·10	29·96	68	49	12	06
			16	W	30·13	29·97	65	52	10	20
			17	Var.	29·84	29·70	64	53	11	24
			18	NE	29·90	29·85	67	52	18	
			19	N	29·90	29·85	67	46	10	
			20	N	30·10	29·96	64	50	16	
					30·40	29·44	83	44	3·18	2·14

Notes T. F.—*June* 28. Early in the morning *Cumuli* were observed floating at different altitudes: about 11 p. m. a very hard thunder storm came on.

July 1. Rain and lightning continued through the night. 7. *Cirrostratus* in dark spots to NW about sunset. 8. The same succeeded by storms. 12. The clouds appear mountainous and electric, with drops of rain. 16. Fleecy *Cumuli* beneath *Cirri*. 18. Fine towering *Cumuli*, and rather windy. 19. Spots of cloud before the moon. The air remains dry, notwithstanding the rain.

Notes J. G.—*July* 1. About seven o'clock in the evening, the atmosphere began to thicken in the W, at which time there were two very distinct currents, the lower E and SE—the upper W, which soon prevailed. In about an hour after, a vivid flash of lightning—the thunder very distant, followed by heavy rain. Wind tempestuous, lightning very frequent in the night.--6. A *Stratus* on the marshes at night. 11. About half-past 2 p.m. wind E, the western horizon began to darken, soon after which there was a hurricane, the wind blowing in all directions, but most furiously from the W, which finally prevailed: this was immediately succeeded by a storm of thunder, lightning, and heavy rain, which continued about an hour: the evening afterwards was fine. 14. About 2 p.m. a very considerable thunder storm from the W, which continued about half an hour, accompanied with heavy rain, and large hail at intervals: the whole afternoon unsettled, with thunder at a distance, the lightning at first very vivid: at half-past four an uncommonly loud clap of thunder, resembling the report of a cannon: evening fine. 16. Some thunder in the afternoon: a *Water-spout* at Ramsgate, (see note).

RESULTS.

Winds Variable.

Barometer:	Greatest height	30·40 in.
	Least	29·44 in.
	Mean of the period	29·94 in.
Thermometer:	Greatest height	83°
	Least	44°
	Mean of the period	62°
	Evaporation (in 20 days)	3·18 in.
	Rain (in the same)	2·14 in.

Thunder storms appear to have prevailed extensively. That of the first of the seventh month did considerable damage at Sheffield: that of the 14th was attended with a number of accidents (detailed in the Papers) in Middlesex, Kent, &c. On the 15th, (if the date be not incorrect) there was a hail storm at Windsor, in which hailstones as large as common marbles ravaged the gardens, and beat the fruit off the trees.

Ramsgate, July 16.—During a squall of thunder and rain, a stream of water, seven or eight feet in diameter, issued from a very heavy black cloud in the east; which, after taking a horizontal direction towards the south, for about half a mile, suddenly fell into the sea, a very little distance from the shore, with a rushing noise, agitating the water all around in a most extraordinary manner, and rebounding again to the height of several yards.—(PUB. LEDGER).

TABLE XLVII.

	1810.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
7th Mo.	L. Q.	July 21	NW	30·10	29·96	60°	48°	14	—
		22	N	30·20	30·12	67	44	14	—
		23	W	30·21	30·21	71	53	17	—
		24	SW	30·20	30·10	78	45	21	
		25	E	29·94	29·86	77	59	20	—
		26	SE	29·86	29·71	71	52	15	41
		27	SW	29·68	29·52	68	53	09	13
	New M.	28	SW	29·65	29·61	66	52	13	69
		29	W	30·00	29·94	71	56	16	
		30	W	29·80	29·78	67	52	14	
		31	SW	29·86	29·83	70	41	13	31
8th Mo.		Aug. 1	NW	29·97	29·85	68	45	12	—
		2	NW	30·01	29·92	73	57	09	07
		3	SW	29·90	29·80	75	56	17	25
		4	SE	29·65	29·58	71	54	14	20
		5	SW	29·74	29·70	70	50	12	20
		6	W	29·82	29·79	72	57	—	—
	1st Q.	7	NW	29·70	29·64	72	59	28	41
		8	NW	29·92	29·60	64	53	—	—
		9	NW	30·04	29·99	65	52	30	33
		10	SW	29·82	29·73	70	53	—	—
		11	W	29·73	29·67	68	53	53	18
		12	NW	29·90	29·70	68	57	13	14
		13	NW	29·88	29·52	66	55	—	
	Full M.	14	W	29·85	29·84	67	57	42	65
		15	NW			68	49	—	—
		16	NW			53	47	14	40
		17	NW			63	40	—	
		18	W			70	49	29	
		19	W			67	47	—	—
		20	NW			69	49	17	
				30·21	29·52	78	40	4·56	4·37

NOTES T. F.—*July* 21. Moon appears bright; and its edges well defined. 23. *Cirri* and *Cirrostrati.* 24. Small meteors, commonly called falling stars, observed. 25. *Cirri* and spongy *Cumuli.* Distant thunder in the evening. 26. *Cirrostrati* prevail—very dark night, 27. High wind in squalls.

August 6. *Cirrostratus* prevails. 9. Fine rows of *Cirrostratus* above *Cumuli.* The moon appears hazy and obscure. 10. *Cirri* and *Cirrostrati* preceded high wind in squalls. 11. Windy. Swifts, *Hirundines apodes*, still common. 12. Windy and small rain. 13. The modification of cloud called *Cirrus* prevalent; squalls of wind and flying *Cumuli*. Some heavy black clouds came over about 6 p. m. which threatened rain. 14. Clouded hazy day. At night the moon appeared hazy, and indicated rain, which ensued during the night.

Notes J. G.—*July* 25. Some showers p. m. 27. Wind extremely high all the afternoon. 28. About 1 p. m. a thunder storm with heavy rain and hail: several other thunder showers in the course of the afternoon. A house was struck at Ilford, (see the note). 31. A very heavy shower with thunder about 5 p. m.

August 3. A rainy night. 5. Thunder p. m. 13. Wind extremely high from the NW. 15. Rainy morning. 16. Wind high and bleak, with small rain most of the day. 18. Foggy morning. 19. Slight showers p. m.

RESULTS.

Winds Westerly.

Barometer:	Greatest height	30·21 in.
	Least	29·52 in.
	Mean (of 25 days)	29·848 in.
Thermometer:	Greatest height	78°
	Least	40°
	Mean of the period	59·98°
Evaporation		4·56 in.
Rain		4·37 in.

Thunder storms appear to have prevailed very extensively on and about the fourth of the eighth month in the north of England, and in Scotland. An anecdote in the notes, which appears to belong to this date exemplifies the terror with which even wild animals are inspired by near discharges of electricity.

Saturday se'nnight, about one o'clock, during a heavy storm of thunder, lightning, and rain, the electric fluid struck the roof of the Coach and Horses public-house, Ilford, Essex. In its course it took the bell-wires, which it melted into the size of small shot; it then took the door-posts of the parlour, which, with the force, were shivered to splinters nearly the whole height; it then rolled a considerable way into the parlour, where, being evaporated, it totally disappeared, leaving behind it a most sulphurous smell, and on the floor a place scorched so much as to be entirely black. Although several persons were in the parlour and rooms adjacent, they received not the least injury.

At Carnforth, about six miles from Lancaster, during a dreadful thunder storm, as a person of the name of Taylor was sitting alone in his house, he heard something scratch at the kitchen-door; thinking it was the cat, he opened the door; a large foulmart (or polecat) rushed past him, and sat down by the fire. The man, astonished, sat down in his chair and looked earnestly at the strange visitor, which also stared hard at him; at length, after a loud clap of thunder, the foulmart leaped upon the man's lap, who, putting it into a wire cage, exhibited it to his neighbours.

TABLE XLVIII.

1810.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
8th Mo.	L. Q.	Aug. 21	W			71°	44°		
		22	NW			78	49	38	
		23	NW			80	48		
		24	Var.			83	49	27	
		25	NE			83	58	21	
		26	W	30·13	30·03	75	54	11	
		27	N	30·17	30·14	73	52		
		28	NW	30·21	30·20	78	49	25	
		29	E	30·19	30·12	72	55		
	New M.	30	NW	30·08	30·01	74	59	22	8
		31	E	29·96	29·95	82	62	—	
9th Mo.		Sept. 1	SE	29·96	29·93	83	61	44	
		2	E	29·99	29·95	85	63	31	
		3	SW	29·90	29·78	68	53	—	—
		4	NW	29·95	29·75	61	48	28	44
		5	W	30·05	30·05	64	54	—	
	1st Q.	6	W	30·27	30·02	67	40	32	
		7	E	30·40	30·31	68	38	—	
		8	N	30·24	30·16	71	39	26	
		9	NE	30·06	30·04	73	51	—	
		10	W	30·00	29·96	68	48	28	—
		11	SW	29·95	29·70	61	48	—	12
		12	N	30·00	29·72	59	41	10	—
	Full M.	13	NW	30·15	30·08	62	48	—	
		14	NW	30·38	30·16	69	41	23	
		15	NE	30·40	30·37	62	50	—	
		16	NE	30·30	30·20	64	57	18	09
		17	E	30·14	30·10	72	49	—	
		18	NW	30·10	30·10	66	53	14	
		19	N	30·16	30·13	61	50	—	
				30·40	29·70	85	38	3·98	0·73

NOTES T. F.—*August* 26. Slight squalls of wind about 10 h. m. 27. Summer lightning during night 28. *Cirrostratus* disposed in long strata, extending from N. to S. 29. Light fleecy *Cumuli;* fog at intervals, very partial. 30. Sky thinly covered with *Cirrostratus* early. Summer lightning and showers at night. 31. Very loud peal of thunder, and hard rain about 3 a. m. *Cirri* and *Cirrocumuli;* at night very vivid lightning succeeded by hard thunder showers.

September 1. *Cirri* and *Cirrocumuli:* temperature increasing. 2. *Cirri,* &c. Wind (as is usual in hot weather) rises soon after noon, and falls towards night. 3. Tufts of *Cirrus* early. Rain set in about 5 p. m. and continued through the night, accompanied by lightning.

Notes, &c. *(continued).*

6. Windy in the day. 10. *Cirrostratus* and *Cirrocumulus*; the former prevailing. Rain succeeds. 12. Very beautiful sunset. I observed two bars or streaks of *Cirrostratus* of a rich crimson colour, extending from SW to NE on a ground of almost golden hue, at the apparent altitude of about 20°. 13. *Cirrostratus* disposed in beds of small spots, succeeded by small rain, and warmer air. 14. *Cirrostratus* and *Cirrocumulus*. 19, 20. Calm, heavy, dull weather. Horizon very foggy, and sky overcast.

Notes J. G.—*August* 21. A *Stratus* at night on the marshes. 22. Foggy morning. 29. The same. 30. Distant thunder and lightning about 11 p. m. 31. About half-past 2 a. m. a tremendous peal of thunder resembling repeated discharges of artillery: it was preceded by extremely vivid lightning; the latter prevailed through the night, and played particularly for a considerable time upon the surface of a barge-load of *coke*, which lay near the laboratory: about 10 p. m. a distant storm again perceptible.

RESULTS.

Winds for the most part Northerly and Easterly.

Barometer:	Greatest height	30·40 in.
	Least	29·70 in.
	Mean of the period	30·03 in.
	The whole for 25 days.	
Thermometer:	Greatest height	85°
	Least	38°
	Mean of the period	60·65°
Evaporation		3·98 in.
Rain		0·73 in.

TABLE XLIX.

	1810.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
9th Mo.	L. Q.	Sept.	20	NE	30·04	30·08	63°	55°	—	
			21	NE	30·08	29·97	71	55	—	
			22	SE	29·97	29·86	71	51	31	
			23	Var.	30·03	29·86	63	54	—	
			24	NE	30·09	30·03	68	57	—	
			25	NE	30·05	30·03	73	53	—	
			26	NE	30·03	29·95	71	45	—	
			27	NE	29·87	29·85	71	47	59	
	New M.		28	NE	30·00	29·87	69	44	—	
			29	E	30·00	29·93	67	52	—	
			30	E					—	
10th Mo.		Oct.	1	E	30·23	29·93	71	43	31	
			2	E	30·23	30·22	56	41	—	
			3	NE	30·24	30·13	66	41	—	
			4	NE	30·13		63		22	
	1st Q.		5	NE		29·85		41	—	
			6	Var.	29·92	29·86	62	44	—	
			7	SW	29·93	29·90	69	45	19	
			8	Var.	29·90	29·88	69	50	—	
			9	NE	29·88	29·80	62	54	—	—
			10	NE	29·88	29·80	59	48	—	
			11	NE	29·88	29·83	61	47	32	
	Full M.		12	N	30·20		58		—	
			13	N		29·80		32	—	
			14	NE	30·20	30·15	60	39	—	
			15	E	30·15	29·88	58	41	36	
			16	SE	29·88	29·65	57	43	—	49
			17	S	29·35	29·30	65	55	—	—
			18	SW	29·72	29·35	63	46	—	—
			19	SW	29·72	29·68	59	56	41	29
					30·24	29·30	71	32	2·71	0·78

NOTES.—Ninth Mo. 20. Grey sky: slight indications of *Cumulus* uniting with *Cirrostratus*. 21. A *Stratus* this night and the last. 22. Mostly clear a. m. then various clouds ending in *Nimbus*. 23. *Nimbus* to the S: a shower. 24. A very lively pink tinge in the W at sunset, and a fainter red in the E: the wind sprung up fresh, and the night was cloudy, with a faint flash or two of distant lightning. 25. A fine day. 26, 27. Clear: *Stratus* at night. 28. The same: about 7 p. m. a bright blue meteor descended obliquely in the E. 29. Cloudy: some appearance of an active electricity. 30. Rain early, after which fair.

Tenth Mo. 7. The nocturnal *Stratus* has prevailed (with gossamer) since the beginning of the month. 8. In the course of this day, the wind, which was first N with mist, went slowly by S to E, when distant *Nimbi* appeared: and after sunset a swift *scud* came from that quarter. 9. About 7 a. m. a slight shower or two. 10, 11, 12. Brisk winds: *Cirri*: lunar halo. 13. Hoar frost. 14, 15. Windy: *Cirri*. 16. a. m. wind E, *Cirrocumulus* passing to *Cirrostratus*, in bars from N to S, nearly crossing the visible hemisphere: in the latter quarter a haze tinged purplish by the sun. The wind shifted for a while to S, and there was rain at intervals p. m. 17. Rain. 18, 19. Much wind.

NOTES T. F.—*September* 22. A great disturbance of the electric state of the atmosphere was conspicuous. A fog covered the ground at sunrise; about noon I observed *Cirri* spread about at a great altitude: these were succeeded by *Cirrostrati*, *Cirrocumuli*, and *Cumuli* of various appearances; some large and lowering, others loose dark coloured fleeces, floating in a lower region. Towards evening the wind rose, and the barometer fell; but the night turned out calm and clear, and summer lightning prevailed. 23. Several modifications of cloud. Clear night, and summer lightning. 25. Overcast at sunrise; very clear day afterwards; falling stars. 26. Clear day, and rather windy in the middle; calm clear night. Small meteors. 27. *Cirrostratus* during the day, disposed in beds of small aggregates, extending in arcs across the zenith. Clear night; small meteors frequent. 29. Foggy at sunrise. After it cleared off, *Cirrostratus*, dispersed about in the atmosphere; in some places in thin films, in others in rows of small spots. *Cirrocumulus* also appeared. Loose flocks of dark reddish *Cumulus* in a lower region. At sunset a very highly coloured *Cirrostratus*, on an almost golden sky, gave the W horizon a very beautiful appearance. Rain came on during the night. 30. The western sky appeared deep red after sunset.

October 1. At night the stars' light suddenly diminished, and a lucid burr (not a halo) was observed round Jupiter. 2. Electric state of the atmosphere very much disturbed; various modifications of cloud. A breeze rose from E at 10 a. m. Clouds highly coloured at sunset. 3. Clear day; only *Cumuli* passed over with the wind. 6. *Cirrocumuli*; heat increasing. 12. Swallows and martins last seen. 16. A total change in the weather took place to-day. An intervening current from the south, and the prevalence of *Cirrus* and *Cirrostratus*, indicated rain, which came on during the evening. 17—20. During this period, the weather was warm, accompanied by rain and high wind at intervals. *Cirrocumulus* and *Cirrostratus* prevailed between the showers.

RESULTS.

Prevailing Winds NE and E nearly to the close of the period.

Barometer:	Greatest height	30·24 in.
	Least	29·30 in.
	Mean of the period	29·91 in.
Thermometer:	Greatest height	71°
	Least	32°
	Mean of the period	56°
Evaporation		2·71 in.
Rain		0·78 in.

TABLE L.

	1810.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
10th Mo.	L. Q.	Oct. 20	SW	29·68	29·60	64°	49°	—	91
		21	SW	29·60	29·30	62	56	—	30
		22	SW	29·59	29·30	60	48	53	
		23	NW	29·73	29·50	57	43	—	
		24	N	30·16	29·73	58	36	—	
		25	N	30·35	30·16	52	33	32	
		26	NE	30·35	30·21	52	44	—	
		27	Var.	30·21	29·68	—	—	—	—
	New M.	28	Var.	29·68	29·54	54	31	14	92
		29	NW	29·85	29·60	45	30	—	—
		30	NW	30·01	29·85	45	27	—	
		31	W	29·85	29·71	46	35	19	27
11th Mo.		Nov. 1	NE	29·74	29·68	53	37	—	—
		2	NE	29·95	29·93	48	46	—	—
		3	NE			47	43	—	30
	1st Q.	4	NE	29·93	29·68	46	31	18	—
		5	SW	29·68	29·17	45	35	—	—
		6	Var.	29·17	28·98	47	33	—	—
		7	Var.			—	—	—	39
		8	Var.	29·43	28·98	49	32	12	
		9	NE	29·43	28·60	53	38	—	—
		10	NE	29·18	28·50	50	43	—	10
	Full M.	11				46	43	—	
		12				48	31	—	06
		13		30·15	28·50	48	30	—	
		14	SE	30·15	29·54	54	36	—	
		15	SW	29·54	29·27	58	53	—	1·25
		16	SW	29·30	29·20	58	49	—	
		17	SW	29·46	29·20	54	45	10	35
				30·35	28·50	64	27	1·58	4·85

NOTES.—Tenth Mo. 20. Windy: much drizzling rain. 21. Windy: small rain: stormy night. 22. Much wind: cloudy p. m., stormy night. 23. Windy, cloudy. 24. Hoar frost: *Cumulus*, with the superior clouds, ending in *Nimbus:* some appearance of lightning, with a small meteor. 25. Hoar frost: *Cumulus* ending in *Nimbus:* meteors. 26. No dew: cloudy. 28. Rain from before sunrise to near sunset. 29. *Cirrus:* snow in the night: brisk wind. 31. Rain at intervals.

Eleventh Mo. 1—8. Cloudy, windy: wet at intervals. 9. A shower mixed with hail about noon. Lofty piles of *Cumulus* and *Cumulostratus*, p. m., the moon first very pale, then faintly obscured by elevated *Cirri* and haze, with a faint halo of the largest diameter. At 9 p. m. the barometer, which had risen to 29·43 began to fall with a strong gale from the eastward and abundance of rain. 10. At noon the rain abated: the wind going by S to SW, but presently returning to NE. 11. a. m. Cloudy: no dew: NW. 12, 13. Hoar frost: cloudy: windy: misty at night. 14. Very wet night. 15. Maximum of temperature at 9, with the wind SW: stormy wet night. 16. Windy: some heavy showers early.

NOTES T. F.—*October* 21. The weather has been much damper ever since the 16th, so as to render the *glass stands* of a peculiar sort of electrical instrument of no use, by making them serve as *conductors.* 22. High wind all day. 29. Stars hazy; very cold air.

November 9. Wind rose during the night, and became very high. 10. High wind all day. A small coloured corona or burr observed round the moon about 10 p. m. 14. Before sunrise I observed the clouds towards the east very highly coloured with red and deep crimson. 15. Much rain fell during the night.

RESULTS.

Winds Northerly in the middle, SW at the beginning and end of the period.

Barometer:	Greatest height	30·35 in.
	Least	28·50 in.
	Mean of the period	29·59 in.
Thermometer:	Greatest height	64°
	Least	27°
	Mean of the period	45·48°
Evaporation		1·85 in.
Rain		4·85 in.

METEOR.—An article in the German Papers, dated from Waly on the Meuse, the 22d ult. says:—On the 19th of this month, between five and six o'clock in the evening, a luminous meteor appeared to the south, about the distance of a quarter of a league from the small commune of Brezeau; persons who attentively examined it assert, that it was nearly a quarter of an hour in collecting, floating over the place where it was first seen, and that when all its parts had united, it appeared all at once as a very considerable globe of fire, taking a northerly direction; it spread terror among the inhabitants of the village, who believed their houses would be burnt, and they themselves perish. This globe was accompanied by a frightful noise, which was heard at the distance of more than a league and a half, and sometimes resembled the rolling of a rapid chariot, at others, the noise of rain violently driven by the wind. It was followed by a very thick fog, and carried up from the ground every thing that it met in its passage. In crossing a river it absorbed the water, which soon afterwards fell in rain. It wandered for some time near the village. One thing certain is, that the roof of a house was thrown down, which is the only trace it has left. It was accompanied and followed by an abundant rain, much lightning, and loud claps of thunder. Continuing in the same direction, it suddenly turned into a column of fire, which, with the fog, rose towards the heavens. This made many persons believe the fog was smoke. It remained about a quarter of an hour in this state, a quarter of a league to the north of the village, and at a short distance from the forest of Beaulieu. This column now sunk a little, and at last suddenly disappeared, leaving a thick fog, which had no smell. This phenomenon lasted three quarters of an hour, and travelled over the space of half a league.

TABLE LI.

	1810.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
11th Mo.	L. Q.	Nov. 19	SW	29·70	29·61	53°	42°	—	
		20	NW	29·71	29·58	52	43	—	34
		21	SE	29·58	29·48	57	45	—	—
		22	Var.	29·85	29·58	52	43	21	1·16
		23	SE	29·86	29·83	54	45	—	—
		24	E	29·79	29·68	53	39	—	38
		25	SE	29·64	29·56	48	36	—	—
	New M.	26	Var.	29·39	29·19	47	37	—	63
		27	E	29·22	29·09	46	39	—	—
		28	W	29·08	28·94	47	35	—	—
		29	SE	29·13	29·04	43	34	14	36
		30	W	29·42	29·19	40	29	—	
12th Mo.		Dec. 1	S	29·70	29·47	37	30	08	
		2	SW	29·89	30·02	35	25	—	
	1st Q.	3	SE	29·95	29·95	43	31	—	—
		4	W	29·96	29·92	49	38	—	—
		5	W	29·95	29·89	50	45	—	—
		6	S	29·63	29·42	52	41	14	42
		7	SW	29·42	29·36	46	34	—	
		8	W	29·79	29·54	39	26	—	—
		9	NW	29·94	29·89	36	26	—	
	Full M.	10	SE	29·60	29·38	38	34	—	74
		11	NW	29·90	29·56	36	28	—	
		12	NW	29·76	29·60	49	40	—	—
		13	W	29·93	29·80	51	49	32	—
		14	W	29·78	29·66	52	38	—	98
		15	NW	30·06	29·88	45	36	—	
		16	Var.	30·25		42	30	—	
		17	SW	30·10	29·94	49	42	—	—
		18	Var.	29.65	29·45	50	38	19	53
				30·25	28·94	57	25	1·08	5·54

NOTES T. F.—*November* 16. Very windy showery night. 17. Flash of lightning about half-past 6 p. m. 20. The maximum of thermometer at 11 p. m. 21. Thunder clouds about. 22. Showers of hail and rain; lightning at night. 23. Flash of lightning at night. 30. Moon well defined; but yellowish. Flashes of lightning observed.

December 2. *Cirri, Cirrostrati,* and *Cirrocumuli,* early; succeeded by change of weather. 4. Very damp. 5. *Cirrostratus* and *Cirrocumulus.* Windy night. 9. Sky overspread with *Cirrocumulus,* p. m. 10. Upper current NNE to-night. 11. A burr round the moon, about half-past 10 p. m. a little coloured with yellow, red, and green, at its extremities. 13. *Cirrostratus* and *Cirrocumulus* in the afternoon: rain came on at night, accompanied by high wind, and increasing temperature. 14. Very windy showery day; but clear night. 15. Early a. m. *Cirrostratus* was spread about the sky, and threatened rain. It however cleared: and at night light tufts of *Cirrus*, approximating to *Cirrostratus*, scattered about, presented a very curious sky by moonlight.

NOTES J. G.—*November* 22. Rainy morning—a heavy shower of hail about 1 p. m.—afternoon extremely stormy, with hail. 23. An *ignis fatuus* observed in the marshes in the evening, which continued for a considerable time. 26th. Several *ignes fatui* seen in different parts of the marshes at night—some of them extremely bright. 27, 28. The *ignis fatuus* again seen in the evening—the following day the marshes were flooded from an overflow of the river, since which time they have not been observed.

December 3. White frost. 4. Very foggy morning. 5. Foggy morning. 6. Rainy morning. 9. White frost. 10. Very rainy morning—some snow mixed with rain. 14. Night very stormy, with heavy rain. 16. Evening very foggy. 18. Stormy day.

RESULTS.

Winds Variable: Easterly rather predominated in the former, Westerly in the latter part of the period.

Barometer:	Greatest height	30·25 in.
	Least	28·94 in.
	Mean of the period	29·66 in.
Thermometer:	Greatest height	57°
	Least	25°
	Mean of the period	41·15°
Evaporation		1·08 in.
Rain		5·54 in.

TABLE LII.

	1810.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
12th Mo.	L. Q.	Dec. 19	NW	29·84	29·50	42°	34°	—	
		20	SW	29·81	29·38	50	39	—	—
		21	W	29·38	29·33	44	41	28	28
		22	W	29·68		52	41	—	—
		23	SW			52	40	—	80
		24	NE			51	40	—	76
		25	W			49	40	31	32
	New M.	26	NW	29·85	29·80	52	43	—	
		27	NW		29·54	46	38	—	—
		28	NW	30·30	30·20	37	31	—	19
		29	NW	30·50	30·36	34	27	—	
		30	NW	30·50	30·50	34	25	—	
1811.		31	N	30·51	30·35	32	27	40	
1st Mo.	1st Q.	Jan. 1	NE	30·28	30·15	28	24		—
		2	NE	30·05	29·85	28	23		—
		3	Var.	29·76	29·71	28	18		—
		4	E	29·95	29·91	31	24		
		5	NE	29·89	29·83	28	25		
		6	NE	29·94	29·84	28	23		
		7	NE	29·94	29·90	29	24		
		8	NE	29·86	29·82	29	20		
	Full M.	9	NE	29·94	29·86	30	20		—
		10	E	29·97	29·94	42	20		—
		11	S	29·82	29·74	44	35	—	36
		12	S	29·68	29·49	48	35	—	—
		13	SW	29·70	29·66	46	39	—	36
		14	Var.	29·70	29·66	50	43	12	—
		15	W	29·60	29·62	45	32	—	12
		16	W	30·06	29·88	46	53	—	
				30·51	29·33	52	18		3·19

NOTES T. F.—*December* 16. *Cirrostratus* disposed in beds, p. m. 17. *Cirrocumulus* in the intervals of the fog a. m.; *Cirrostratus* p. m. 18, A burr round Jupiter. 20. Hard squalls of wind during the night. 21. Very high wind, particularly at night. 25. High wind accompanied by flashes of lightning all night. 26. The marshes along the Lea flooded.

1811. *January* 4. Very high wind. 5. Dark fleeces of *Cumulus* seen floating beneath *Cirri*, which were in a calm region above. 12. The doors of the house swelled with damp. 16. *Cirrostratus* and *Cirrocumulus*.

NOTES J. G.—*December* 21. Rainy morning. 22. Wind very high all night. 24. Very windy night, with heavy rain. 25. Wind high all day, with rain; frequent lightning in the evening from SE. 26. Wind very boisterous early in the morning—day fine: the rain of the last three or four days being impeded in its passage to the Thames by the spring tides, overflowed the banks, and filled the marshes. 27. Rainy morning—wind blowing strong from the NW. 28. Some snow in the afternoon. 29. A little snow in the afternoon. 30. Clear, frosty morning—some snow in the evening. 31. Ground covered with snow in the morning.

1811. *January* 1. Snow to the depth of about two inches fell in the course of the day. 2. Snow at intervals during the day. 3. Snowy morning—wind S. Thermometer 24° at 9 a. m. 4. Wind very bleak and high during the day; continued all the night of the 4th to blow furiously from the E and NE. 5. Wind very high all day. 6. Day very fine; wind abated; moon extremely bright in the evening. 7. Wind again very boisterous in the morning; evening cloudy. 9. Snowy morning; some appearances of a thaw in the afternoon; evening cloudy. 10. Hoar frost, very thick fog; thermometer 20° at 9 a. m.: the trees had a most beautiful appearance from the frost, till the afternoon, when the wind shifted to the SE and S, and a thaw commenced, accelerated by a gentle rain in the evening. 11. Rainy morning; thermometer 42° at 9 a. m. The evaporation since the beginning of the month has been very considerable, most of the snow having disappeared during the continuance of the frost; an accident to the gauge prevented its being measured.

RESULTS.

Winds for the most part Northerly.

Barometer:	Greatest height	30·51 in.
	Least	29·33 in.
	Mean (some of the lower observations wanting)	29·88 in.
Thermometer:	Greatest height	52°
	Least	18°
	Mean of the period	35·86°

Evaporation to the end of the year ...... 0·99 in.
The remainder of the period imperfect.
Rain .... 3·19 in.

NOTES, &c. (*continued*).

Comparison of the Winds and Weather, during the foregoing two periods, with the same in the Island of Iceland.

A Register of the Weather kept at Reikiavik in Iceland, and published in Sir Geo. Mackenzie's Travels, offers the following interesting points of comparison with the weather in Britain, during the fore part of this winter:—

1810.	At Stratford.	At Reikiavik.
Dec. 6	Wind S: showery.	Wind NE: a gale.
10	——— SE: rainy.	——— NE: clear.
14	——— W: much rain.	——— NE: clear.
18	——— Var: rainy.	——— NE: rained a little, and froze again.
20	——— SW: rainy.	Heavy snow.
23—27	——— W and NW chiefly: but once NE, about two inches of rain in the first three days.	——— NE: all fine days.
29—31	——— NW and N: fine days, with a little snow.	——— SE: a gale the whole time, with much rain.
1811. Jan. 1—3	——— NE: very cold and snowy.	Southerly gales, with rain.
8—10	Weather as above.	Weather as above.
14—18	Weather the reverse of the above.	Weather the reverse of the above.

From a third Register, kept at the intermediate distance of 180 miles from Stratford, and on the opposite side of our Island, viz. that of Thos. Hanson, at Manchester, it may now be shown that the contrast of Stratford with Reikiavik, was not the result of local causes.

At *Manchester*, Dec. 6. Wind S: rainy. 10. E: snow; (here the intermediate station has an intermediate current.) 14. S: boisterous with rain. 18. S: fine. 20. S: rainy. 23—28. SW chiefly: about an inch of rain. 29—31. N: fair. 1811. Jan. 1—8. N, NE, and E, with snow. 9, 10. SE: clear and variable. 14—18. Westerly gales, with about an inch of rain.

Thus it appears, that on many days in the course of the first six weeks of the winter of 1810—11, the greater part of Britain was subject to a current proceeding in an opposite direction to that which prevailed in Iceland: and this obtained whether the Winds were Northerly or Southerly. That it should snow and freeze in Iceland, while we have mild weather about London, seems perfectly natural:

but it has probably never been suspected, that *our* periods of frost are contemporaneous with *their* intervals of rain and thaw.

This subject is certainly deserving of a more particular investigation, but the paucity of observations with instruments in Iceland presents a great obstacle: yet a good comparison may be formed on the general reports of such as visit that island in trading vessels.

EARTHQUAKES IN ITALY.

"At Parma, in the night between the 24th and 25th Dec. (1810,) there was a very severe shock of an earthquake. Several persons, who came from the midnight mass, were thrown down in the streets. In Genois-street, all the chimnies tumbled down, and several houses sustained considerable damage."

"The earthquake seems to have extended quite across Italy.—An article, dated Verona, December 25, says:—'We yesterday experienced here the shock of an earthquake, the heaviest I ever witnessed. It lasted ten seconds, and its direction was from N to S.—Some few persons were hurt, but no lives were lost.'—Another from Genoa, of the 26th, says:—'At one o'clock in the afternoon, we felt here a violent shock of an earthquake, in the direction from E to W. It lasted from eight to ten seconds, set the bells a ringing, and produced much confusion amongst the furniture of the inhabitants. Three old houses tumbled down. No farther mischief was done either here or in the neighbourhood.'"

WINTER THUNDER STORMS.

"The phenomenon of a thunder storm on Christmas day, (1810,) was not confined to this country, but was experienced in several places in Germany, and followed by so dreadful a gale of wind, that many houses were blown down, and the heavy laden waggons on the public roads overturned."

WINTER IN SIBERIA.

"Letters from various districts in Siberia, dated in October last, mention that the winter has commenced unusually early in that country. The cold set in in the middle of September, and the snow fell in such quantities, as to prevent the harvest, which was very abundant, from being entirely got in."—(PAPERS.)

TABLE LIII.

	1811.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
1st Mo.	L. Q.	Jan. 17	NW	29·82	29·75	51°	39°	30	
		18	W	29·96	29·80	40	32	—	
		19	NW	30·48	30·40	41	27	—	
		20	SE	30·41	30·15	40	30	—	
		21	SW	30·15	30·10	38	31	—	
		22	NW	30·20	30·20	36	31	12	
		23	SE	30·31	30·30	40	33	—	
	New M.	24	N	30·50	30·47	39	31	—	
		25	Var.	30·54	30·51	37	27	—	
		26	W	30·36	30·08	42	31	08	6
		27	NW	29·64	29·60	40	25	—	
		28	NW	29·65	29·63	31	19	—	
		29	NW	29·76	29·63	27	14	—	
		30	N	29·78	29·55	34	21	—	
	1st Q.	31	E	29·18	29·08	45	34	13	31
2d Mo.		Feb. 1	S	29·43	29·29	46	35	—	—
		2	E	29·68	29·55	46	38	—	
		3	S	29·90	29·60	49	29	—	
		4	SE	30·13	30·10	48	30	—	
		5	E	30·05	29·72	46	35	—	
		6	S	29·65	29·52	51	45	—	
		7	SW	29·82	29·60	52	39	45	18
	Full M.	8	SW	29·74	29·58	49	40	—	—
		9	N	29·78	29·62	47	41	—	—
		10	S	29·85	29·70	52	48	—	—
		11	SW	29·55	29·37	52	45	34	47
		12	SW	29·34	29·30	49	35	—	—
		13	SW	29·34	29·25	40	35	16	44
		14	NW	29·68	29·21	42	35	—	
		15	E	29·80	29·15	42	36	—	—
				30·54	29·08	52	14	1·58	1·46

Notes T. F.—*January* 20. *Cirri* and *Cirrostrati* observed. 26. Cold increasing, although the wind was SW; a white frost. 27. I observed an arc of *Cirrostratus* to extend across the zenith in the direction of the wind. Snow fell during the night.

February 2. About 9 p.m. I observed a lunar halo. I took the diameter of its area with a quadrant, which was about 40°. 3. Showery morning; towards evening I observed red coloured *Cirrostrati* in an apparently calm region; while fleecy *Cumuli* floated beneath them in the wind. The *Cirrostrati* refracted a fine red tint, while the *Cumuli*, passing under, and making the same angle with the sun, appeared blackish. 4. White frost, succeeded by thaw. About 8 p.m. a lunar halo of about 40° diameter appeared for a few minutes during the passage of a *Cirrostratus* before the moon. 5. Sky variously spotted, streaked and freckled with *Cirrostratus* in the morning, and with *Cirrocumulus* at night. 6. Temperature much increased. In the evening I observed a double lunar corona; that is, a small one within a larger one. I have observed that coronæ as well as halones are generally prognostics of approaching rain, &c. 7. *Cirrus*, *Cirrostratus*, and *Cirrocumulus* preceded showers of rain and hail. 8. Sky highly coloured at sunrise; at night I observed, by the motion of the clouds, that there were two currents of air. 10. Frogs observed about. Thrush sings. 13. Hard shower of hail about noon.

NOTES J. G.—*January* 20. White frost. 28. A little snow in the morning. 29, 30. White frost. Thermometer 13° at Plaistow.—Wind very boisterous in the evening; a considerable quantity of snow (about three inches) fell during the night, wind E, blowing very strong. 31. Rainy morning: barometer falling, evening stormy.

RESULTS.

Winds Variable.

Barometer:	Greatest height	30·54 in.
	Least	29·08 in.
	Mean of the period	29·80 in.
Thermometer:	Greatest height	52°
	Least	14°
	Mean of the period	38·05°
Evaporation		1·58 in.
Rain		1·46 in.

METEOR.—"On the night of the 26th of January, a large globe of fire, of a very deep red, was seen to pass through the air, at Wasserbourg, a small town of Bavaria, ten leagues from Munich; it descended gently, and fell into the Inn without explosion." Supposing the appearance in question to have been a large elevated *Meteor*, this apparent fall into the *river* was probably a deception of sight.—L. H.

SUBMARINE VOLCANO.

St. Michael's, Azores, Feb. 17.—"On the 26th, 27th, and 28th of January this island again experienced several very severe shocks of an earthquake. On the 31st, a tremendous explosion of smoke and flames issued from the water, at the distance of half a league, or two English miles from the shore, to the W of our island. The scene was awful beyond all description, and from the bowels of the inflammatory substance, upwards of 80 fathoms deep in the ocean, issued smoke, fire, cinders, ashes, and stones, of an immense size. Quantities of different kinds of fish floated on the surface of the sea towards the shore. This dreadful eruption of fire has perhaps been the saving of the island and its inhabitants."—(PAPERS.)

TABLE LIV.

	1811.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
2d Mo.	L. Q.	Feb. 16	NW	29·95	29·36	40°	25°	—	18
		17	NW	30·20	30·18	38	29	47	
		18	SE	30·14	30·05	45	31	—	
		19	E	29·99	29·82	41	30	—	
		20	E	29·74	29·70	40	34	—	
		21	E	29·51	29·27	51	39	15	
		22	S	29·18	29·09	54	35	—	
	New M.	23	SE	29·25	29·25	54	41	16	24
		24	SE	29·18	29·04	51	37	—	—
		25	SW	29·40	29·14	49	38	—	18
		26	W	29·30	29·25	55	42	—	
		27	W	29·65	29·50	49	40	42	—
		28	S	29·78	29·50	52	40	09	08
3d Mo.		March 1	W	29·78	29·58	47	38	—	—
	1st Q.	2	W	29·80	29·80	52	46	26	05
		3	W	30·00	30·00	54	42	—	
		4	W	30·02	30·00	55	46	—	
		5	S	29·80	29·35	55	42	—	—
		6	W	29·63	29·46	52	48	46	33
		7	W	29·39	29·30	57	48	—	—
		8	S	29·78	29·33	58	34	—	52
		9	NW	30·46	30·20	45	34	35	
	Full M.	10	W	30·52	30·47	53	40	—	
		11	Var.	30·48	30·46	56	41	—	
		12	SE	30·46	30·42	53	38	—	
		13	NE	30·40	30·34	52	39	27	
		14	NE	30·38	30·34	49	36	—	
		15	E	30·39	30·35	48	29	—	
		16	E	30·31	30·25	54	27	30	
				30·52	29·04	58	25	2·93	1·58

NOTES T. F.—*February* 17. This afternoon appeared *Cirrostratus* of various figures, *Cirrocumulus* and fleeces of *Cumulus*. 18. Various modifications of cloud again to day. 24. Gentle showers with clear intervals. 25. The moon appeared of a deep brazen colour. 28. A lunar corona succeeded by showers.

March 1. *Cirrostratus* as usual prevailed between the showers. 3. *Cirrostratus* and *Cumulus* prevail. A lunar corona round the moon all the evening, and sometimes a halo. 4, 5. A few *Cirri* and *Cirrostrati;* windy. 6. I observed *Cirrus*, approximating to *Cirrostratus*, disposed in faint whitish transverse bars, and forming a kind of reticular plexus, or net work in the zenith: a windy night. 8. The wind got to the NE, and was high at night. 10. Fleeces of *Cumulus* richly coloured by the rising sun. 13. Clear morning: as the day advanced I observed *Cirri* of various shapes ramifying in all directions, *Cirrostrati*, and *Cirrocumuli*. In a lower region *Cumuli* floated along in the wind. The general appearance of the clouds to-day indicated a great disturbance of the electric state of the atmosphere: very similar kind of weather prevailed during last September, and a curious circumstance which then took place, happened again on the return to day of the same kind of weather; namely, the irregular pulsation of the electric bells of De Luc's column. 14. Only *Cumuli* passed over with the wind. The electric bells of De Luc's column pulsate very irregularly. 15. Clear night, falling stars seen.

NOTES J. G.—*March* 1. About a quarter past 2 p. m. a *Nimbus* passed over, discharging rain; after which a rainbow appeared, the colours of the complementary bow extremely distinct. 2. Wind very high all night. 3. A large halo round the moon in the evening. 6. A shower of hail about noon—evening rainy—wind high. 7. Wind high in the morning—afternoon very showery—evening and night stormy. 8. Rainy morning. 12. Foggy morning.

RESULTS.

Winds Variable.

Barometer:	Greatest height	30·52 in.
	Least	29·04 in.
	Mean of the period	29·82 in.
Thermometer:	Greatest height	58°
	Least	25°
	Mean of the period	43·93°
Evaporation		2·93 in.
Rain		1·58 in.

TABLE LV.

	1811.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
3d Mo.	L. Q.	March 17	Var.	30·17	30·17	61°	26°	11	
		18	Var.	30·15	30·15	62	35	—	
		19	W	30·23	30·20	55	42	—	
		20	W	30·15	30·07	57	49	—	
		21	SW	30·05	30·05	60	45	31	6
		22	NE	30·38	30·13	50	29	—	
		23	NW	30·50	30·48	56	30	—	
	New M.	24	E	30·40	30·28	54	36	20	
		25	E	30·21	30·11	53	32	—	
		26	NE	30·24	30·10	56	31	18	
		27	NE	30·45	30·23	57	26	—	
		28	Var.	30·60	30·48	62	36	—	
		29	NE	30·61	30·55	61	31	—	
		30	NE			62	37	38	
	1st Q.	31	NE	30·22	30·16	50	43	03	
4th Mo.		April 1	E	30·10	30·00	55	34	—	
		2	Var.	29·98	29·90	64	43	—	
		3	W	30·04	29·98	62	39	25	
		4	N	30·15	30·09	63	41	—	
		5	NE	30·18		57	28	—	
		6	N			61	33	—	
		7	NW	29·55	29·52	40	31	30	6
	Full M.	8	NE	29·62	29·59	46	28	—	
		9	N	29·79	29·67	46	26	—	
		10	Var.	29·90	29·85	54	37	—	—
		11	Var.	30·22	30·03	51	32	38	
		12	Var.	30·23	30·12	55	46	—	35
		13	SW	30.15	30·00	65	54	—	—
		14	W	30·20		65	51	33	15
		15	NW			61	52	—	—
				30·61	29·52	65	26	2·47	0·62

NOTES T. F.—*March* 18. This evening *Cirri*, becoming *Cirrostrati*, observed. De Luc's electric bells quite silent. 19. *Cirrocumulus* and gentle showers. Electric bells ring weak, but regularly. 20—22. During this period mild winds and damper air prevailed. Electric bells pulsated pretty regularly: on the evening of the 22d fleecy evanescent *Cumuli* indicated clear weather. The electric bells became silent at night. 23. Cloudy; fine purple and yellow coloured sunset. Bells silent. 24. Very clear; only faint streaks of the *Linear Cirrus*. 25. Early I observed *Cirrus*, ramifying about in all directions, and becoming *Cirrostratus* and *Cirrocumulus*: fleecy *Cumuli* floated in the wind beneath them. Bells silent. 27. *Cirrus* prevailed this evening, and became *Cirrostratus*, coloured by the setting sun. Bells begin to ring again. 28, 29. *Cirrus* and *Cirrostratus*. Bells ringing irregularly, or at intervals.

April 1. A meteor seen to SW about 9 p.m. 2, 3. *Cirrostratus* and *Cirrocumulus* alternately prevail. 4. This afternoon fleecy, rocky, and mountainous *Cumuli*; in a higher region *Cirrostratus* and *Cirrocumulus* in different places, the latter most abundant during the day, but the former ultimately prevailed, and at night exhibited a lunar halo, of the usual diameter, *i. e.* between 40° and 50°. From the 24th March the electric bells rang irregularly till about the 14th April, when they rang regularly and loud till the 18th, when they ceased, and have not rung since.

NOTES J. G.—*March* 16—18. White frost. 20. Evening much clouded—wind high. 21. A little rain early in the morning. 23. White frost. 30. Morning foggy. 31. Very cloudy day.

April 6. White frost and foggy. 7. Some gentle rain and some snow in the morning, day very cloudy and cold. 14—16. Some gentle refreshing showers.

RESULTS.

Winds variable, but chiefly Northerly.

Barometer:	Greatest height	30·61 in.
	Least	29·52 in.
	Mean of the period	30·12 in.
Thermometer:	Greatest height	65°
	Least	26°
	Mean of the period	46·75°
Evaporation		2·47 in.
Rain		0·62 in.

FRANCE. *Hail Storm.*—The departments of Agin, and the Upper Marne, in France, were, at the beginning of April, visited by a dreadful hail storm, *which killed many persons*, as well as cattle, destroyed the vines, and did much mischief besides. Many of the hail stones were five inches long, and two inches diameter, and weighed six ounces. The storm was succeeded by a frost, which lasted two days.

IRELAND. *Meteor.*—April 5, at ten o'clock at night, a large and most brilliant meteor passed in a northerly direction over the eastern extremity of Belfast. It was of a most beautiful and vivid white, and appeared to expand itself considerably as it passed, with an undulatory motion.—(PAPERS).

TABLE LVI.

	1811.			Wind.	Pressure.		Temp.		Evap	Rain, &c.
					Max.	Min.	Max.	Min.		
4th Mo.	L. Q.	April	16	Var.	30·00		62°	41°	—	17
			17	NW			61	45	18	
			18	SE	29·34	29·22	62	34	—	—
			19	E	29·29	29·28	62	48	—	9
			20	S		29·34	65	52	35	12
			21	S	29·68	29·59	68	48	—	
	New M.		22	E	29·68	29·60	69	52	—	—
			23	SE	29·76	29·62	77	48	47	
			24	NW	29·87	29·80	75	52	—	
			25	Var.	29·85	29·80	66	49	—	
			26	NW	29·78	29·66	69	40	36	
			27	NE	29·64	29·62	66	39	—	
			28	Var.	29·65	29·55	68	51	—	
			29	SW	29·71	29·67	58	46	—	—
	1st Q.		30	SW	29·81	29·78	61	48	52	5
5th Mo.		May	1	S	29·68	29·65	64	54	—	11
			2	SW	29·98	29·66	61	46	23	—
			3	SW	30·05	29·91	64	54	—	22
			4	SW	29·94	29·91	67	55	—	—
			5	SW	29·95	29·73	62	40	39	18
			6	E	30·08	29·93	58	46	—	31
			7	Var.	29·83	29·72	56	46	—	10
	Full M.		8	Var.	29·85	29·72	63	51	—	—
			9	S	29·58	29·52	62	46	22	40
			10	Var.	29·78	29·75	69	51	—	—
			11	SW	29·85	29·84	74	50	—	
			12	Var.	29·78	29·66	82	56	40	4
			13	E	29·59	29·52	83	60	—	
			14	S	29·74	29·51	72	43	30	
					30·05	29·22	83	34	3·42	1·79

NOTES T. F.—*April* 17. Only *Cumulus* observed. 18. *Nimbi* pouring hail and rain. 19. *Cirrus* appeared early, followed by *Cirrostratus*, *Cirrocumulus*, and *Cumulus*, and eventually by *Nimbus* and showers. 21. *Cirrus* extending its fibres along with the current of air. In a lower region *Cumuli* float along in different planes, the lower ones black and lowering. The cuckow and swallow first seen. A lucid meteor observed about 3 p. m. 22—25. *Cirrus*, *Cirrostratus*, *Cirrocumulus*, *Cumulus*, and *Cumulostratus*, of various figures continually prevail, with summer lightning and dry air. 26, 27. Same kind of clouds with showers. 28. The multiform appearance of the *Cirrostratus* exhibited a beautiful sky this afternoon; in some places it was finely *undulated*, then became *reticular*, and lastly *confused vapour*. *Cirrocumulus* and *Cumulus* also seen: showers late in the evening. 29, 30. *Nimbi* (with cirrose fibres extending from them) pouring down showers.

May 1. Continued showers through the day. 2, 3. Showers with clear intervals. 4. Only *Cumuli* to-day. 6—8. Showery at times. 9. Rainy. 11. *Cirrostratus* coloured by setting sun. 12—14. *Cirrus*, &c. Sky deep blue in the eastern horizon. On the 13th only *Cumuli*; 14th, *Cirri* and *Cumuli*. 15. Only *Cumuli* in forenoon. Towards evening *Cirrus*, *Cirrostratus*, and *Cirrocumulus*, in different altitudes, by approaching and collasping, formed very dense *Nimbi*: and exhibited very various tints and unusual appearances, which ended in rain. The electric bells of De Luc's column were silent till the 7th May, when they began to ring, and have continued ringing, more or less regularly, till the present time.

NOTES J. G.—*April* 18. Showers and sunshine—in the twilight of the evening a brilliant meteor descended in the E, of the apparent magnitude of Venus—there were heavy clouds in the NE horizon at sunset, with much haze above them. 19. *Cirrus*, *Cumulus*, and *Cirrostratus* clouds, with a strong easterly breeze. 20. The first swallow made its appearance this forenoon. 21. Some lightning in the evening. 22. Some distant thunder heard this morning—much lightning in the NW at night. 23. Some rain about 5 a.m.—the cuckow heard this morning. 24. Foggy morning. 29. Wind high from the SW in the morning, with showers—afternoon, wind increased, with rain mixed with hail—some thunder at a distance.

May 1. Gentle showers during the day. 2. Showery day. 3. Very cloudy, with showers. 5. Wind very high from the SW all day, with showers—generally clouded. 6. Morning very fine, wind gone down, changed in the course of the last night to the eastward; afternoon very cloudy, with showers;—night rainy, wind high. 9. Rainy morning; continued to rain till towards evening, which was fine—some distant thunder in the afternoon. 10. Showery and fine; towards evening a rainbow, and some distant thunder. 13. Some lightning in the evening.

RESULTS.

Winds variable, but mostly Southerly.

Barometer:	Greatest height	30·05 in.
	Least	29·22 in.
	Mean of the period	29·70 in.
Thermometer:	Greatest height	83°
	Least	34°
	Mean of the period	57·19°
Evaporation		3·42 in.
Rain		1·79 in.

TABLE LVII.

	1811.			Wind.	Pressure,		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
5th Mo.	L. Q.	May	15	SE	29·82	29·81	72°	55°	14	—
			16	E	29·90	29·82	70	39	—	
			17	NE	29·92	29·90	77	48	—	
			18	NE	29·94	29·89	76	57	—	
			19	NE	30·00	29·98	61	51	35	51
			20	NE	29·94	29·82	74	51	—	30
			21	SE	29·75	29·72	70	55	—	—
	New M.		22	E	29·75	29·69	76	54	28	
			23	NW	29·95	29·81	72	50	—	
			24	SE	29·95	29·93	73	57	—	
			25	W	30·10	30·01	81	54	52	
			26	E	30·05	30·04	84	56	—	
			27	Var.	30·00	29·78	80	61	—	—
			28	SW	29·80	29·68	70	60	—	—
			29	SW	29·97	29·72	62	48	66	14
	1st Q.		30	W	30·00	29·81	77	56	—	14
			31	SE	29·62	29·48	75	52	26	7
6th Mo.		June	1	Var.	29·72		79	53	—	
			2	NE	29·54	29·49	67	51	25	49
			3	W	29·98	29·70	64	50	—	
			4	SW	29·90	29·85	71	59	—	—
			5	S	29·79	29·68	67	53	53	27
	Full M.		6	SW	29·89	29·81	75	53	—	
			7	S	30·05	29·99	80	53	—	
			8	Var.	29·96	29·85	88	53	56	—
			9	W	30·24	30·22	74	46	—	
			10	E	30·15	29·98	77	54	—	
			11	SW	29·98	29·98	72	52	65	
			12	SW	30·08	30·05	73	47	—	—
					30·24	29·48	88	39	4·20	1·92

NOTES T. F.—*May* 16, 17. *Cirrus* and *Cirrostratus* followed by *Nimbi;* but no rain fell hereabout. Distant thunder heard. 18. Close day: in the afternoon various modifications of cloud appeared; in some places they showed a tendency to *Cirrocumulus*, in others *Nimbification* seemed rapidly going on; about 5 p.m. the sky, seen behind a large *Cumulostratus* under the setting sun, was of a deep brownish lake colour: as evening approached mountainous clouds rose majestically in the horizon, while others above were fringed with bright gold: rain succeeded in the night. 20. A uniform mass of cloud obscured the sky at sunrise; as the day advanced it broke, and divided itself into several distinct modifications. *Cirrocumulus* of various figures, in some places looking like wind-rows of hay, in others consisting of small round *Nubeculæ*, appeared; as well as *Cirrus* spread out in continuous sheets approaching to *Cirrostratus*, while flocks of *Cumulus* floated along in the wind below. In the wind about noon I observed a *Cirrus* cloud of a very remarkable figure; it consisted of many light tufts of a sort of *horse-shoe figure*, rising one above another. In the evening the distinct modifications were lost in a general haziness of a reddish colour; in some places blackish spots appeared, which were the *Nuclei* on which *Nimbi* formed, and thunder storms continued through the night. 21, 22. Thunder storms with fair intervals. 23. *Cumuli* alone early: in evening, streaks of *Cirrus* above them; some clouds showed a tendency to *Cirrocumulus*. 24. *Cirrocumulus* followed by increased heat, and evening lightning. 25. *Cirrostratus* strewed at different altitudes, also *Cirrocumulus* and *Cumulus*: in the evening *Cirrostratus* becomes dense, and approaches to *Nimbus*. 26. Various clouds, evening lightning. 27. *Cirrus* ramifying about, becomes *Cirrostratus*, which obscures the sky. 30. *Cirri* and *Cumuli*, followed by undulated and plane *Cirrostratus*. 31. Stormy day; upper currents blow in various directions.

June 4. Various clouds through the day: in the evening extensive beds of *Cirrocumulus*. 5. Showers. 6. *Cirrocumulus*, *Cumulus*, &c. In evening a thin sheet of *Cirrostratus* exhibited a faint ill-defined simple lunar halo. 7. In the evening a simple lunar corona. 12. Various clouds, with light showers: while at Plaistow with Mr. Howard, I observed large *Cumuli* pass under ramifying *Cirrus*, which rapidly (in consequence) became small flimsy *Cirrocumuli*, and presented a beautiful piece of sky.

NOTES J. G.—*May* 15th. Very considerable appearances of a storm in the W in the evening. 16. Some distant thunder in the afternoon—appearance of a heavy storm in the W at the same time. 18. Some gentle rain in the morning. 19. Gentle rain most of the day. 20. Lightning very frequent in the evening—thunder at a distance—about 10 p.m. a very vivid flash; immediately after which, a brilliant meteor descended in the SE. 21. About 4 a.m. a heavy thunder storm, the thunder remarkably loud—morning rainy. 22. Evening rather stormy; very frequent lightning, and thunder at a distance. 27. Evening rather clouded, with some lightning. 28. Very cloudy morning, wind high from the SW. 29. Wind very high all day—frequent lightning in the evening. 31. Some rain in the morning, with thunder.

June 2. Very rainy day. 8. Frequent thunder and lightning in the evening, with high wind.

RESULTS.

Winds Variable.

Barometer:	Greatest height	30·24 in.
	Least	29·48 in.
	Mean of the period	29·88 in.
Thermometer:	Greatest height	88°
	Least	39°
	Mean of the period	63·19°
Evaporation		4·20 in.
Rain		1·92 in.

EXTRAORDINARY METEOR.

On the first day of this period, about half-past 8 p.m. a very singular luminous meteor was seen to the NNW of *Geneva*, passing over France: the same appears also to have been seen from *Paris*. It had at first the shape of the letter S, and was very slow in its apparent motion, being visible for seven or eight minutes, till concealed by a cloud: it was accompanied by a kind of whizzing noise. Professor Pictet, on comparing the different observations, concluded that it was elevated 24½ leagues above the earth's surface.—(See NICHOLSON'S JOURNAL, vol. xxx. pa. 216.)

TORNADO.

On the 12th of May, about five o'clock in the afternoon, a destructive phenomenon appeared at Bonsall, in the Peak of Derbyshire. A singular motion was observed in a cloud of a serpentine form, which moved in a circular direction, from S, by W to N, extending itself to the ground. It began near Hopton, and continued its course about five or six miles in length, and about four or five hundred yards in breadth, tearing up plantations, levelling barns, walls, and miners' cots. It tore up large ash trees, carrying them from 20 to 30 yards; and twisted the tops from the trunks, conveying them from 50 to 100 yards distance. Cows were lifted from one field to another, and injured by the fall; miners' buddle-tubs, wash-vats, and other materials, carried to a considerable distance, and forced into the ground. This was attended with a most tremendous hail storm, stones, and lumps of ice were measured from nine to 12 inches circumference, breaking windows, injuring cattle, &c.—(P. LEDGER.)

AGITATION OF THE SEA AT PLYMOUTH.

An alarming and most uncommon flux and reflux of the sea took place May 31, commencing about 3 a.m. and not finally terminating till ten. The sea fell instantaneously about four feet, and immediately rose about eight feet: universal consternation pervaded the whole of the port. The vessels in Catwater were thrown about in the greatest confusion; many dragged their anchors, some drifted, and several lost their bowsprits and yards. About a quarter before seven the sea rose to the height of 11 feet, and again receded. At half-past nine the tide (half-flood) suddenly stopped; and, in a moment, ebbed six inches and a half; at ten it ebbed again in the same most extraordinary manner, and then flowed as usual to high water. Two gales from SSW and E, preceded this astonishing phenomenon; but at the time of its occurrence the wind was light at SSW.

June 8.—About four o'clock, the tide again flowed and ebbed several feet in as many minutes, which continued at intervals for the space of four or five hours, during which the immense swell, commonly called a *boar*, drove into the harbours of Sutton Pool and Catwater, at the rate of four knots an hour, subjecting the vessels at anchor there to great danger. The wind was variable, but mostly south-west. During the operation of the *boar*, it thundered and lightned excessively.—(P. LEDGER).

NOTES, &c. (continued).

STORMS OF HAIL, THUNDER, &c.

From the various accounts of these in the Papers at this season, the following are selected, for the purpose of comparison with phenomena under the corresponding dates in our Register:—

We learn by a letter from his Majesty's ship Indefatigable, that the ships which sailed under her convoy for the East Indies, met with a most violent storm, of hail, rain, thunder, and lightning, on the 20th of April, in lat. 46° 46′, long. 11° 39′ west. Four fire-balls passed along the Indefatigable, but they happily did no other damage than setting fire to the foretop-mast, which did not burn long. The Warley was also set on fire; the Perseverance had her maintop-mast struck; and the Warren Hastings her foretop-mast.

April 23.—A violent hail storm at night at Wynnstay, the seat of Sir W. W. Wynn. Some of the hail stones measured 2½ inches in circumference. The whole new range of hot houses, which were only that day finished, had 1123 panes of glass broken.

His Majesty's brig Piercer, being off Ushant, on the night of the 28th of April, encountered a most severe gale of wind at SW, &c. (Details of a tremendous sea follow).

April 29.—One of the severest hail storms ever remembered came on at Welton, and lasted for above a quarter of an hour. The damage done to the gardens was very great, all the fruit-trees being stripped of their blossoms, and the glass of the hot-houses perforated as if bullets had been shot through them.

May 19.—At Sheffield, there was a dreadful storm of thunder and lightning, accompanied with hail. The stones, which measured from one to five inches in circumference, were pieces of ice encrusted with frozen snow. The damage is beyond precedent. At Beauchief, a whirlwind tore up seven trees by the roots, broke several in the middle; many buildings were unroofed, and haystacks thrown down; *nearly all the water was carried out of Mr. Stead's mill-dam, and dispersed in the air.*

May 20.—A severe thunder storm came on at Ingatestone, accompanied with a deluge of rain. In ten minutes the water ran about three feet deep in the streets. The same night at Potter-street, on the road to Newmarket, hail stones nearly as large as pigeons' eggs fell, accompanied with the most terrific thunder and lightning.

HEREFORD, *May* 27.—We were visited by a dreadful storm of thunder and lightning, accompanied by torrents of rain, very destructive eastward of this city. It commenced about three o'clock in the afternoon, and continued with little intermission till past eight. (This storm, and the consequent inundation of several thousand acres of land, destroyed a number of lives and much property).

June 8.—A severe storm of rain, hail, and lightning took place in Birmingham and the neighbourhood. The hail, or rather pieces of ice, which fell, are described of prodigious size, and considerable damage has been done to the windows.

WORCESTER, *June* 8.—This day another most tremendous storm of thunder, lightning, and rain took place about 11 a. m. equal to that of the 27th ult. except the hail.

A storm was also experienced (June 28), at Bury and its neighbourhood. The lower part of the houses were filled with water, which lay in the street five feet deep. The hail stones, 5-8ths of an inch in diameter, broke near 5000 panes of glass.—About 26 head of cattle were killed last week by the lightning, at Risby and Walsham, in Norfolk.

TABLE LVIII.

	1811.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
6th Mo.	L. Q.	June 13	W	30·17	30·15	72°	46°	—	
		14	SW	30·10	29·88	73	49	61	
		15	SW	29·96	29·88	73	47	—	
		16	W	30·10	30·04	72	50	31	—
		17	NW	30·22		72	45	—	
		18	SE	30·40	30·34	79	46	27	
		19	NW	30·26	30·14	75	55	—	
	New M.	20	NW	29·95	29·78	66	46	30	
		21	N	29·90	29·78	62	43	—	—
		22	N	29·94	29·91	60	44	36	5
		23	N	29·87		60	51	—	
		24	N	29·80	29·75	75	46	20	
		25	E	29·95	29·84	79	53	—	
		26	Var.	29·98	29·95	76	57	32	41
		27	NE	29·95	29·89	74	61	—	9
	1st Q.	28	N	29·96	29·91	67	60	—	50
		29	N	29·91	29·89	68	59	—	
		30	N	29·89	29·88	65	58	17	
7th Mo.		July 1	NE	29·88	29·86	66	61	—	
		2	Var.	29·96	29·90	76	58	—	18
		3	NE	30·13	30·00	59	48	16	—
		4	NW	30·15	30·14	58	43	—	
		5	SW	30·17	30·13	67	47	—	
	Full M.	6	N	30·10		71	54	—	—
		7	N	29·98	29·97	67	54	36	7
		8	N	30·00	29·98	73	52	—	
		9	SE	30·10	30·06	75	57	—	
		10	Var.	30·14	30·10	80	52	—	
		11	NW	30·19	30·15	78	58	69	
				30·40	29·75	80	43	3·75	1·30

NOTES T. F.—*June* 13. *Cumuli* early; in evening *Cirrus*, *Cirrostratus*, and *Cirrocumulus*. 14. Early the sky was filled with light *Cirrose* fibres, *Cumuli* floated beneath them; afterwards *Cirrocumulus*, *Cumulostratus*, &c. appeared. 16. Early appeared the *Cirrus*, followed by general obscurity and a gentle shower; afterwards *Cirrocumulus* was observed overhead through the general mistiness; about 3 p. m. the sky again became obscure, and it rained. In the evening the sky exhibited very interesting and beautiful phenomena. Long thin sheets of the *Cirrostratus* appeared in the N and NW, some of them acquired the appearance of the architectural cyma, they perpetually changed their figures, and some which extended over dense *Cumulostratus* became (apparently in consequence) *Cirrocumulus*, which cloud ultimately prevailed; at 11 p.m. I saw an extensive bed of it. 17—20. Fair weather. *Cirri* continually observed above, while *Cumuli* float beneath them. On the 20th the morning was cloudy with few drops of rain, and a clear evening. 21. Sky well covered with clouds all the morning; afterwards it cleared, and *Cumuli* appeared. About 5 p.m. a smart shower came on, after which *Cumulostrati* continued to pass over, while *Cirrostratus* and *Cirrocumulus* appeared to extend over them in a higher region. Spongoid evanescent *Cumuli* also appeared. 25. Wind strong in the day. The evening was calm, and the sky above the setting sun of a rich yellow colour; a large bed of *Cumulostratus* passing over exhibited very beautiful deep red tints. About half-past nine a small meteor appeared in the SE, it was simply a stationary accension, and lasted scarcely a second. 27—*July* 3. Sky obscured with clouds almost all this time, with occasional rain, damp, and mostly warm air, and a north wind; it sometimes cleared for a short time, when several strata of clouds of various kinds appeared. 5. *Cirrus* seen early, followed by beautifully arranged beds of undulated *Cirrostratus* and *Cirrocumulus*, and lastly by *Cumulostratus*. 6, 7. Various clouds as heretofore. 8. A change in the electricity of the atmosphere was observable to day: a cloudy sky was followed by *Cirri* ramifying chiefly toward the east; in the evening the modifications appeared in their natural order, *Cirrus* the highest, and *Cirrocumulus*, *Cirrostratus*, and *Cumulus*, in successively lower regions.

NOTES J. G.—*June* 27. Rainy morning. 28. Very rainy day: some lightning in the evening.

RESULTS.

Prevailing Winds Northerly.

Barometer:	Greatest height	30·40 in.
	Least	29·75 in.
	Mean of the period	30·02 in.
Thermometer:	Greatest height	80°
	Least	43°
	Mean of the period	60°
Evaporation		3·75 in.
Rain		1·30 in.

NOTES, &c. (*continued*).

SUBMARINE VOLCANO.

(*From a coloured plate of the phenomenon, published by Boydell,* 1812).

"This eruption broke out in the sea on the 18th of June, 1811, about a mile from St. Michael's, (Azores). On the 17th, Capt. Tillard, commander of H. M. S. Sabrina, in company with Mr. Reid the Consul, and two other gentlemen, proceeded to the cliff nearest to it, which was between 300 and 400 feet above the level of the sea. Its appearance when quiescent was that of an immense body of white smoke, revolving almost horizontally on the water; when suddenly would shoot up a succession of columns of the blackest cinders, ashes, and stones, in form like a spire rising to windward, at an angle of from 70° to 80° from the horizon, and to a height of between 700 and 800 feet above the sea. The columns at their greatest height broke into branches, resembling magnificent pines: and as they fell, mixing with the festoons of white feathery smoke, assumed at one time the appearance of plumes of black and white ostrich feathers, at another that of the light wavy branches of a weeping willow. These bursts *were accompanied by the most vivid lightning*, and by a noise like the continued firing of cannon and musquetry intermixed: and as the cloud of smoke rolled off to leeward, *it drew up a number of waterspouts*, which formed a beautiful and striking addition to the scene. While the party were viewing the eruption, *a crater* began visibly to be formed above water, though the volcano was then only four days old, and the depth of the sea was 30 fathoms!"

The sequel of the account states that in little more than a fortnight a complete island was formed, nearly a mile in circumference, and about 300 feet high: Captain Tillard took a drawing and plan of the phenomenon. From the *crater*, which continued open, flowed *a stream of boiling water* six yards over. This island gradually disappeared towards the close of the year, being converted by the waves into an extensive shoal: but in two months afterwards smoke again issued from the sea near the place.

THUNDER STORMS.

Waterford.—During the earlier part of Monday, July 1, the atmosphere was sultry almost in the extreme. Dark clouds were seen towards the NE, and thunder was heard at times from the same quarter. Till two o'clock, the wind blew from NW, at which hour it suddenly changed and blew from the E, and this city was almost immediately visited by one of the most tremendous storms that have, in all probability, ever been experienced in Ireland. For the space of an hour, the thunder and lightning succeeded each other in awful and nearly uninterrupted rapidity, accompanied by torrents of rain, together with hail stones, of a size greater than any inhabitant of the city remembers to have ever before seen. Some of them, were two, and others three inches in circumference. The streets were every where overflowed; after the storm had subsided, the windows all along the quay, and wherever the houses were unprotected, exhibited the appearance of having been exposed to the assault of fire-arms, few of the panes of glass having escaped. The whole scene exhibited one of those sublime but terrible conflicts of the elements, which the English and Foreign Journalists have had frequent occasions recently to describe, but which are of rare occurrence in this island.

NOTES, &c. (*continued*).

July 1.—As the sloop Diligence, bound from Truro to Plymouth, was coming round Penlee Point, a flash of lightning struck the vessel, by which the crew and passengers were laid senseless on the deck. In this state the greater part of them remained some minutes, but none of them received any serious injury, The mast of the vessel was split in every direction, and the top-mast was shivered to pieces, as if cut up by an axe. *Fortunately the lightning did not come in contact with the cargo, which consisted of gunpowder!*

July 2.—In the neighbourhood of Wonash, near Guildford, after one of the most sudden strokes of thunder, a deluge of rain took place, so instantaneously as to carry away or destroy every thing which impeded its progress—The damage is estimated at not less than 1,500*l.* The same day a thunder storm, accompanied with torrents of rain, came on at Oxford and its vicinity. A barn at Finstock was set on fire by the electric fluid; the flames communicated to another barn, and both were destroyed, with a large quantity of wheat contained therein.

North Wales has been recently visited by several awful storms, and very serious injury has been sustained by many persons. On Wednesday, July 10, the town of Llanidloes was drenched with torrents of rain, accompanied by dangerous lightning; the windows of several houses were shattered at Trefeglwys, and a great number of sheep have been destroyed on the neighbouring hills.

A heavy storm of rain suddenly came on at Salisbury, July 10, attended with a phenomenon *supposed to be a water-spout,* which hung in a spiral form from the clouds, with the end waving to and fro like the tail of a kite. At first it appeared about a mile to the north of the city, and was drawn up into the clouds about the same distance to the SE. It passed over rather near to the earth, and *a rushing noise* was heard at the same time. Though the rain fell so very heavy there, it extended only two miles.—(PAPERS).

Effects of Lightning on growing Potatoes.

During a thunder storm in the summer of 1811, in my absence, the lightning was seen to strike the ground in a potatoe field, about a furlong to the SW of my house at Plaistow. The spot where it fell (which was rather lower and moister than the surrounding parts) presented the following appearances. The immediate impetus of the lightning was clearly seen in a *smooth round excavation,* from which about a bushel of earth had been *dispersed:* from this proceeded a semicircular *furrow* of about five yards in length, losing itself imperceptibly by ramification. The growing potatoes, for the space of about a square rood, chiefly to the E of the cavity and furrow (and in the probable direction of the stroke) had suffered considerably, but without the least sign of scorching, or other immediate injury to the tops. The damage was *confined to the stems,* which for a few inches in height were partly burnt or *riven,* partly turned *pulpy.* What is extraordinary is, that the far greater part of the plants *survived* the stroke, continuing to grow by means of the small remaining connection of the top with the root. The pulpy ones died (precisely as by *frost*) mixed in every part with the rest, and many of them 20 yards distant from the cavity and furrow above mentioned.

Meteorological Observations

MADE AT

PLAISTOW, NEAR LONDON,

IN THE YEARS

1811 and 1812.

(First published Monthly in Nicholson's Philosophical Journal).

TABLE LIX.

	1811.			Wind.	Pressure.		Temp.		Evap.	Rain &c.
					Max.	Min.	Max.	Min.		
7th Mo.	L. Q.	July	12	NW	30·03	29·91	76°	59°	—	
			13	W	29·91	29·79	75	60	24	42
			14	SW	29·83	29·76	65	59	—	—
			15	S	29·83	29·80	71	59	—	—
			16	SW	29·85	29·83	70	54	43	—
			17	S	29·85	29·75	72	54	—	12
			18	SW			71	60	—	57
			19	SE	29·94	29·75	73	54	—	—
	New M.		20	W	29·94	29·90	64	53	47	79
			21	Var.	29·88	29·82	60	53	—	1·61
			22	W	30·01	29·88	70	50	—	
			23	NW	30·11	30·01	69	50	—	
			24	NW	30·15	30·11	72	54	—	
			25	NW	30·14	30·12	73	55	57	
			26	SW	30·12	30·09	72	51	—	
			27	N	30·09	29·91	74	55	—	
	1st Q.		28	SE	29·91	29·85	78	54	32	
			29	NE	30·11	29·85	75	54	—	
			30	N	30·11	30·08	67	49	—	
			31	NE	30·08		68	52	42	
8th Mo.		Aug.	1	NE		29·90	76	53	—	
			2	S	29·90	29·69	73	51	—	
			3	SW	29·67	29·58	76	51	43	11
	Full M.		4	NW	29·73	29·60	68	54	—	27
			5	S	29·65	29·62	66	52	29	
			6	S	29·59	29·48	63	50	—	26
			7	NW	29·60	29·50	67	54	—	15
			8	SW	29·49	29·35	62	50	32	74
			9	NW	29·60	29·48	64	45	—	33
			10	NW	29·86	29·60	61	44	29	—
					30·15	29·35	78	44	3·78	5·37

NOTES.—Seventh Mo. 15. Small rain about 2 p. m. 19. A thunder shower early: fine day. 20, 21. Forty-eight hours rain. 22. Temperature 60°, (the maximum for 24 hours) at 8 a. m. 26. Orange coloured *Cirri* at sunset. 27. Thunder clouds: a few drops p. m.: much dew. 28. *Cirrocumulus* cloud, very beautiful, interchanging with *Cirrostratus*, succeeded by large *Cumuli*. In the evening some appearance of a thunder storm far in the NW. 29. Evening, parallel bars of *Cirrostratus*, stretching E and W: a blush on the twilight. 30. Windy, cloudy.

Eighth Mo. 2. Large elevated *Cirri*. 3. *Cirrocumulus*, followed

Notes &c. (*continued*).

by *Cirrostratus*: evening overcast: rain by night. 4. Windy, at SW, by night. *Cumulostrati*, in various quarters, at sunset. 7. Opaque twilight, with *Cumulostratus*. 8. Very wet, a. m.; at noon a thunder shower; at 6 p. m. a heavy squall from NW, with rain and hail; the *Nimbus*, as it receded, presenting a perfect and brilliant bow: windy night. 9. Large *Cumuli* rose, and at noon inosculated with the clouds in a superior stratum: a thunder shower ensued before 2 p. m., after which appeared the distinct strata again; about 6 p. m. a second thunder shower, long very dense in the SE, where the bow was conspicuous above an hour. This day was nearly calm. 10. Rain fell again about noon, upon the union of two strata of cloud.

Notes T. F.—*Clapton*, *July* 16. Showers, with fair intervals a. m., evening clear, the sky abounding with *Cirri*, ramifying about, and generally pointing to the E: their kind of (internal) motion may be compared to that of a piece of cheese full of mites. 17, 18. Warm with various clouds.

August 10. Showery day: very clear night: small meteors were very abundant, with this remarkable circumstance that their trains lasted longer, after the extinction of the lucid head, than usual.

RESULTS.

Prevailing Winds Westerly.

Barometer:	Greatest height	30·15 in.
	Least	29·35 in.
	Mean of the period	29.835 in.
Thermometer:	Greatest height	78°
	Least	44°
	Mean of the period	61°
Evaporation		3·78 in.
Rain		5·37 in.

Character of the period changeable, with much rain.

Storms.

July 19.—A most tremendous storm of thunder, lightning, rain, and hail, visited the parish of Guilsheld, Montgomeryshire; a large oak tree, containing about 50 feet of timber, growing near Varenwell, was rent asunder from top to bottom, and the bark thrown to a distance of upwards of 20 yards.

July 21.—A heavy fall of rain did much damage at Stamford. In the meadows about Barrowden, Wakerley, Harringworth, Thorpe, Caldecot, and Bringhurst, immense quantities of hay were carried away. Several thousand loads, it is supposed, have been destroyed, in addition to which the injury sustained by the land has been very great. The water rose thirteen feet in less than four hours in Wood Newton parish.

TABLE LX.

	1811.			Wind.	Pressure. Max.	Pressure. Min.	Temp. Max.	Temp. Min.	Evap.	Rain, &c.
8th Mo.	L. Q.	Aug.	11	NW	30·16	29·86	61°	42°	—	
			12	NW	30·16	30·10	64	50	—	
			13	SW	30·24	30·10	73	52	33	—
			14	NW	30·25	30·09	66	47	—	
			15	SW	30·25	29·97	68	51	—	—
			16	SW	30·14	29·97	68	57	37	—
			17	NW	30·13	30·03	70	45	—	
			18	E	30·03	29·76	72	55	—	2
	New M.		19	Var.	29·72	29·65	68	54	30	35
			20	W	30·05	29·72	64	57	—	5
			21	SW	30·08	30·04	68	56	—	
			22	W	30·04	29·92	71	53	41	—
			23	S	29·92	29·73	68	55	—	4
			24	E	29·73	29·52	70	55	—	—
			25	SW	29·70	29·50	65	48	16	39
			26	SW	29·78	29·70	67	56	—	
	1st Q		27	W	30·07	29·74	68	44	—	1
			28	Var.	30·11	30·03	66	51	42	
			29	SW	30·17	29·96	69	46	—	2
			30	NW	30·20	30·13	69	47	24	
			31	SW	30·02	29·97	71	53	—	
9th Mo.		Sept.	1	NW	30·22	30·02	68	45	—	
	Full M.		2	N	30·29	30·26	65	45	—	
			3	NE	30·29	30·24	64	53	34	
			4	NE	30·24	30·18	62	53	—	
			5	E	30·18	30·15	71	52	—	
			6	E	30·17	30·13	73	44	35	
			7	NE	30·19	30·13	72	43	—	
			8	E	30·20	30·17	74	47	22	
					30·29	29·50	74	42	3·14	0·88

Notes.—Eighth Mo. 11. *Cumulostratus*, dense about noon, but which soon after dispersing, a brilliant sunset ensued. 12. a. m. cloudy: wind SW. 13. A few drops at intervals: rain in the S by inosculation. 14. a. m. *Cumulus*, with haze gradually increasing above: p. m. clouds below disperse; a fine elevated veil of *Cirrus*, coloured at sunset. 15. Elevated clouds, with traces of *Cumulus:* some large drops about noon: at sunset, the western sky richly coloured with red and yellow, on *Cirrocumulus* passing to *Cirrostratus:* windy night. 16. a. m. Windy: p. m. small rain: clear evening, with coloured *Cirrus* and *Cirrocumulus*. 18. Evening, large *Cirri*, pointing upwards. 19. a. m. thunder showers, chiefly to SSW and N: a strong variable charge in the insulated conductor: evening fair and windy, with *Cumulostratus*. 20, 21. Windy: much dew. 22. Light rain a. m.: showers p. m. 23. Misty morning: *Cumulus*, with *Cirrostratus* from the S: about *one*, these inosculated, and showers prevailed p. m. 24. Misty morning: *Cumulostratus:* a few drops of rain: evening, *Cirrostratus*. 25. Misty, and raining at half-past 8 a. m.: wind SE: evening, *Cumulostratus* evaporating, beneath a veil of *Cirrus*, which at the moment of sunset, was of a light silver grey, and during twilight, passed through yellow, orange, red, and purple, to dull grey; and lastly became again somewhat red: much dew, with a very moist air. 26. A small lunar halo, on clouds moving in a northerly current. 27. Windy, a m.: small rain, evening: much dew. 28. Windy. 30. a. m. *Cirrus*, with points dependent and crossing, and *Cumulus* forming beneath: at 9 p. m. *Cirrocumulus*, with much dew: the barometer unsteady. 31. Fine day: *Cumulus*, *Cirrus*, *Cirrocumulus:* a diffused blush on the twilight, which begins to be very luminous.

NOTES T. F.—*Clapton*, *August* 21. All the modifications appeared in the day; at times it was quite clouded: in the evening the upper currents, by two Montgolfier balloons, appeared to be S and NW. 23. A balloon, which did not ascend much, went first with a SW then a S wind. 28. Early appeared *Cirri* in a lofty region, while *Cumuli* floated below; cloudy by night. 29. Clear warm morning with various clouds and a strong current from the south, cloudiness and rain followed; a small air-balloon that I launched at one o'clock went with a SW wind. Mr. Sadler in his balloon went with a W and SW wind alternately: the evening was cloudy, and wind various both below and above, as appeared by many fire-balloons. 30. Large *Cirri* ramified about in the morning, and *Cumuli* flew along in an under current; at night the wind next the earth was N, above it E, and still higher long beds of *Cirrocumulus* passed over from SW. 31. Flimsy *Cirrocumulus* from SW.

RESULTS.

Wind Westerly, with little exception, to the time of Full Moon, when it came round by N to the Eastward.

Barometer:	Greatest height	30·29 in.
	Least	29·50 in.
	Mean of the period	30·025 in.
Thermometer:	Greatest height	74°
	Least	42°
	Mean of the period	59·20°
Evaporation		3·14 in.
Rain		0·88 in.

TABLE LXI.

	1811.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
9th Mo.	L. Q.	Sept.	9	E	30·17	30·15	75°	51°	—	
			10	E	30·15	30·05	77	46	—	
			11	Var.	30·15	30·00	80	55	45	
			12	E	30·19	30·15	73	53	—	
			13	E	30·11	30·01	71	40	—	
			14	E	30·02	29·98	74	45	56	
			15	NE	30·07	30·02	70	55	—	
			16	E	30·05	29·98	66	44	—	
	New M.		17	E	30·05	29·95	70	47	—	
			18	E	29·95	29·87	71	44	95	
			19	SE	29·87	29·50	74	47	—	
			20	SE	29·53	29·50	74	51	—	—
			21	S	29·80	29·53	66	54	32	8
			22	Var.	29·80	29·60	65	52	—	—
			23	SW	29·60	29·43	61	43	—	14
			24	NW	29·62	28·92	64	49	30	14
	1st Q.		25	W	29·26	28·86	60	48	10	46
			26	W	29·21	29·17	61	39	—	10
			27	SW	29·33	29·20	51	40	18	45
			28	NW	29·54	29·33	62	44	—	—
			29	NW	29·71	29·54	64	51	—	20
			30	SW	29·72	29·55	62	50	22	16
10th Mo.		Oct.	1	W	29·76	29·47	63	46	—	4
	Full M.		2	SW	29·87	29·35	64	39	19	
			3	E	29·85	29·46	61	52	—	26
			4	S	29·57	29·46	69	59	—	2
			5	SW	29·75	29·57	67	54	35	15
			6	SW	29·95	29·87	63	52	—	18
			7	SW	29·92	29·85	69	54	21	1
			8	SW	30·00	29·90	67	53	10	
					30·19	28·86	80	39	3·93	2·39

NOTES.—Ninth Mo. 9. Before sunset, after a serene day, *Cirrus* clouds, pointing downwards from the W. 11. *Cirrocumulus*, some dry haze: wind westerly by night, scarcely sensible. 14. *Cirri* and haze in the evening: twilight of a bright orange colour. 15. Much wind: clear. 16. a.m. overcast: p.m. clear: twilight duller, with *Cirrostratus*. 17. Much wind: very clear sky. 18. As yesterday: evening twilight luminous, orange surmounted with rose colour, the latter somewhat in converging streaks. 19. Morning twilight obscure, with dense *Cirri*: much dew: wind a.m. NE: thunder clouds at different heights, some of which moved from the SE: there were clouds throughout the night, with lightning. 20. Wind a. m. NE: thunder clouds again, which grouped, and passed, about 2 p. m. to the W, with a few drops: *Nimbi*, with a faint bow, in the distance: evening cloudy, with two strata: wind SE: much lightning in the SW. 21. a. m. cloudy: rain, with distant thunder at one and 2 p. m.: *Nimbi* and *Cumulostratus*: faint bow. 22. a. m. overcast: wind veered to NW, apparently by E: *Cirri*, in lines from NE to SW. 23. a. m. wind fresh from SW, with rain; p. m. fair, with various modifications of cloud, which were finely coloured at sunset in the east. 24. a. m. clear: much dew: fair day, but with clouds indicating rain: twilight milky, with a blush of red: the moon disappeared early, behind *Cirrostratus* clouds, and it rained heavily in the night. 25. Cloudy and windy, with rain. 26. a. m. *Cirrus* with *Cumulus*: p. m. showers. 27. Windy: wet. 28. a. m. misty: p. m. showers, *Cirrostratus*, and a blush on the twilight. 29. Evening, lightning: wet night. 30. Lunar halo.

Tenth Mo. 1. a. m. wind SE, showery. 2. A little before sunrise I observed a *Stratus* in the marshes to the SE, very nearly resembling a sheet of water; one which was seen from this village, in similar circumstances, about two weeks since, was actually taken by several persons for an extensive inundation: in the afternoon, large elevated *Cirri* and *Cirrostrati*, rapidly passing at sunset from red to grey, indicated a renewal of the wet weather. 3. Misty morning, with *Cirrostratus* above: very wet, p. m. 4. Much wind: cloudy night. 5. Squally. 6. a. m. cloudy, much wind: evening calm; large *Cirri* and *Cirrostrati*, with a blush on the twilight: a bright blue meteor in the NW: wet night. 7. Cloudy, with a gale of wind. 8. Fair.

RESULTS.

Barometer:	Greatest height	30·19 in.
	Least	28·86 in.
	Mean of the period	29·736 in.
Thermometer:	Greatest height	80°
	Least	39°
	Mean of the period	57·85°
Evaporation		3·93 in.
Rain		2·39 in.

From the Full Moon of the last period to the New Moon of the present, easterly breezes with clear days, and the *Stratus* by night. Evaporation went on increasing as the wind became stronger: dew fell in plenty, and the small meteors, called shooting stars, were abundant. The latter half of the present period brought the accutomed compensation, in rain from the westward: the approach of this was perceptible for several days beforehand; and the ground being dry, it was attended at the beginning with some discharges of electricity from the clouds.

HEAT ON THE CONTINENT.

In Silesia, Poland, and Russian Lithuania, the extreme heat, unaccompanied by the least rain, for near two months, has entirely destroyed the hopes of the husbandmen. The fields of wheat, oats, and barley, have been burnt up. The meadows are withered, and the brooks have disappeared; the trees are despoiled of their leaves, and the earth rendered so hard, that they cannot work it.

The excessive heats of July have occasioned the conflagration of several forests in the Tyrol, with the consequent destruction of 64 villages and hamlets, situated in their vicinity, and of the loss of near 10,000 head of cattle. The principal forest, which has thus been destroyed, is about seven miles in extent, and three in breadth, and distance three leagues from Inspruck. It caught fire on the 26th of July, and had not ceased burning on the 4th of August.—(PAPERS).

September 19.—A violent tempest of thunder and lightning was experienced at Stourport. The hail broke an immense number of windows. It came from the east. About the same hour, the storm was very violent at Worcester: the principal body of it seemed attracted towards Malvern Hills: it was preceded by unusual gloom, and a thick cloud of dust; the lightning was of a very vivid description; but we have not yet heard of any serious damage.

HARWICH, *September* 25.—Last night the wind blew a violent storm from the S and SSE, attended with rain.

PLYMOUTH, *September* 25.—It has blown a tremendous gale of wind the whole of this day from NNW.

HURRICANE AT SEA.

A letter, dated the 8th October, from an Officer belonging to the *Tartarus*, gives the following account of the late tempest on the American coast, in which that vessel and her consorts suffered so severely:—"On the morning of the 26th ult. we left Halifax to cruize off the American coast, under the orders of the *Æolus*, Lord James Townshend, and accompanied by the Africa, 64, and Spartan, 38; having fine weather, with every prospect of making a successful cruize; and no ships were ever in a better state of equipment to encounter the storms and danger of the perilous ocean. On the morning of the 30th of September, when pretty near our cruizing ground off New York, in lat. 40° 50′ north, long. 65° west, a heavy gale of wind came on at SE, and blew with tremendous fury. The Æolus, our Commodore, taking the advice of our old friend and companion *the never failing barometer*, made all snug; you may be assured that we followed the example, though every sail in the ship had been braced long before, our top-gallant-masts got on deck, our jib-boom and spritsail-yard taken in, and every thing removed out of the tops.

NOTES, &c. (continued).

The hurricane continued for four hours, with a mountainous sea, during which the quicksilver fell gradually in the barometer until scarcely a particle of it was to be seen above the wood; (probably to near the lower extreme of the scale, or 28 inches, L. H.) but the scenery of the sky is is impossible to describe. *No horizon appeared; but only a something resembling an immense wall, within ten yards of the ship*—at this moment we lost sight of our Commodore, who had only a short time before wore on the other tack: we were in the act of following his motions, when being before the wind, and just coming to, we were laid on our beam ends; our mizen and main-top-masts were blown away, although there was not any sail on them, and *without any person's hearing the crash;* in an instant five feet water rushed into the hold, through the ports of the main deck (all the hatchways were battened down), and the water had reached the coamings of the quarter-deck, when orders were given to throw overboard the larboard quarter-deck guns and the sheet-anchor, or we must inevitably have foundered. In this state we remained nearly half an hour, expecting every moment to be our last, as the stillness of the ship convinced us that she was settling down. We were about to cut away our masts, when fortunately feeling the ship sally to windward, from that moment we entertained some hopes. During all this time the pumps were at work, yet we gained but little, for it was the rudder-coat which had burst in and occasioned the water to rise upon us, and this it still continued to do without our being able to prevent it. The bulk-head of the coal-hole having been washed down by the quantity of water in it, the coals were carried into the well, and three pumps were rendered useless. In the midst of this distress, a faithful servant stationed at the barometer to watch its change, called up through the sky-light (the frame of which had been washed overboard) with great joy, that *the quicksilver had risen an inch*, and still continued to rise. This inspired all hearts with fresh spirit, but no men could behave better, or do more than our crew did. After we had relieved the ship from a great quantity of water, we found the main-mast tottering, and every minute expected that and the bowsprit to go, but our greatest care was the preservation of the lower masts, to save the ship from foundering after the gale, for want of something to bring her to.—All our booms and boats were washed overboard, but we succeeded during the height of the storm, in lowering the main yard on deck, by which means we saved the main-mast from falling, as the rigging had sundered through its seizings, and nothing else could have preserved it. The gale had by this time considerably abated, and about six o'clock in the evening it cleared off, though still blowing hard. We again saw the Æolus about a mile and a half from us, and, with respect to her masts, she had suffered more than the Tartarus. I would, if possible, give you a description of the noise occasioned by the hurricane, but I am unequal to the task: if you can conceive, however, all the savage animals of the brute creation assembled to affright mankind by their roaring, you will have some faint idea of the deafening variety of sounds in the tempest we experienced! The day before yesterday all four ships met together off the harbour, and, under jury-masts—all went in together complete wrecks."

TABLE LXII.

	1811.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.,
					Max.	Min.	Max.	Min.		
10th Mo.	L. Q.	Oct.	9	SW	30·00	29·99	67°	54°	—	
			10	SW	29·99	29·77	63	57	—	
			11	SW	29·77	29·60	65	51	—	
			12	S	29·80	29·60	62	48	40	8
			13	SW	29·90	29·86	62	49	—	3
			14	S	29·86	29·81	63	51	—	1
			15	S	29·76	29·75	73	53	33	
			16	S	30·03	29·76	70	55	—	
	New M.		17	Var.	30·10	30·03	71	47	—	
			18	SW	30·16	30·10	68	50	—	11
			19	Var.	30·21	30·18	65	49	20	
			20	SW	30·05	29·96	64	55	—	
			21	SW	29·96	29·50	65	56	20	
			22	S	29·52	29·46	64	50	—	15
			23	SW	29·50	29·48	60	49	—	
			24	Var.	29·48	29·35	57	42	20	8
	Last Q.		25	S	29·35	28·65	53	38	—	18
			26	Var.	28·80	28·65	54	41	15	32
			27	SE	28·84	28·81	56	43	—	11
			28	Var.	28·84	28·80	56	41	15	44
			29	SW	29·05	29·00	55	43	2	18
			30	Var.	29·55	29·00	58	43	—	14
	Full M.		31	W	29·77	29·68	59	48	15	14
11th Mo.		Nov.	1	SW	29·68	29·62	62	57	—	11
			2	SW	29·58	29·50	62	53	34	14
			3	SW	29·70	29·60	58	48	—	8
			4	W	29·98	29·80	60	42	17	—
			5	SW	29·89	29·83	56	43	—	25
			6	SW	29·83	29·52	53	45	13	50
					30·21	28·65	73	38	2·44	3·05

NOTES.—Tenth Mo. 12. Windy: wet evening. 13. Much wind. 14. A shower before 9 a. m., at which time occurred the maximum of temperature. 15. Much dew on the grass: serene day: twilight milky, with converging streaks of red. 16. a. m., Much dew: a mist on the river: the smoke of the city was remarkably depressed, and sounds from thence unusually strong: some thunder clouds appeared and passed to E. 17. *Cumulus* clouds surmounted with *Cirrostratus*, and *Cirri* above. 18. A very wet mist a. m., wind NW: at 2 p. m. cloudy; very moist air, the *dew point* (or temperature at which a body colder than the air condenses water from it) being 63°: and about sunset, at temperature 63°, I found dew just beginning to be deposited on the grass: it rained hard about five next morning. 19. a.m. Misty, small rain: p.m. clear: evening, *Cirri* very elevated, and long coloured red; a *Stratus* forming. 20. Misty: then overcast: the wind, which had been E, veering by S: abundance of *gossamer*. A quicken tree (*sorbus aucuparia*) exhibits a new set of leaves and blossoms along with the ripe berries. 21. Grey morning, with little dew and a strong breeze. 22. Dew scarce perceptible: wind veers to S, a breeze: p.m. very cloudy, with showers: much wind at night. 24. At mid day a drizzling rain, during which the vane turned to E. 25. Clear, fine day: wind veered to S: at sunset *Nimbi* and *Cirrostrati* in SW: heavy shower by 11 p.m. 26. Showery: a fine rainbow at 10 a.m. 27. *Nimbi* a.m. in different quarters, mixed with *Cumulus* and *Cirrostratus*, beneath large plumose *Cirrus* clouds. 28. Clear a.m., much dew, *Nimbi* forming amidst various clouds: vane at NE: p.m. a shower in the S, during which appeared, for a short time, a numerous flight of swallows: they had been last observed on the 15th: the wind returned by S to NW, with much cloud and rain. 30. At 9 a.m. the rain intermitting, the highest and most considerable mass of clouds was moving from W, an intermediate portion from S, and the wind below fresh at E: in this state of things sounds came very freely from the westward, and by eleven the wind was SW: at 3 p.m. distinct *Nimbi* and a bright bow: showery at night, with a lunar halo. 31. a.m. Clear: the sun and moon appeared red on the horizon; at night, the wind being S, sounds came loud from the W.

Eleventh Mo. 1. Much cloud a.m.: wind fresh at SW. 2. As yesterday: stormy at night. 3. A rainbow at 8 a.m. 4. *Nimbi* a.m. to windward: at sunset, the dense clouds in the E finely coloured: rainbow: wind W. 5. Stormy a.m.: wet p.m. 6. Cloudy, showery: evening, abundance of *Cirrostratus*: a wet night.

RESULTS.

Barometer:	Greatest height	30·21 in.
	Least	28·65 in.
	Mean of the period	29·614 in.
Thermometer:	Greatest height	73°
	Least	38°
	Mean of the period	54·86°
Evaporation		2·44 in.
Rain		3·05 in.

Wind with little exception SW and S: very stormy on the W coast the last week of tenth month. The fore part of the period changeable; the latter wet, without the usual intervening frosty nights.

TABLE LXIII.

	1811.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
11th Mo.		Nov. 7	NE	29·58	29·48	52°	41°	—	7
	L. Q.	8	S	29·65	29·35	52	42	6	19
		9	Var.	29·67	29·34	54	47	—	34
		10	SW	29·34	29·22	55	39	10	21
		11	NW	29·91	29·22	52	36	—	3
		12	NW	29·60	29·50	54	38	18	22
		13	W	29·73	29·69	52	35	—	
		14	SW	29·65	29·57	55	40	12	7
		15	W	29·57	29·49	48	36	11	8
	New M.	16	NW	29·66	29·49	50	41	—	
		17	SW	30·17	29·66	49	44	—	
		18	N	30·25	30·17	50	45	—	1
		19	N	30·39	30·25	53	31	12	
		20	NW	30·39	30·32	48	28	—	
		21	SW	30·32	30·25	46	29	6	
		22	E	30·22	30·18	45	25	—	
	1st Q.	23	NW	30·24	30·22	47	28	6	
		24	SW	30·35	30·24	46	33	—	
		25	NW	30·36	30·35	50	38	5	
		26	W	30·41	30·35	47	41	—	
		27	SW	30·40	30·35	44	40	6	
		28	W	30·35	30·27	48	39	—	
		29	SW	30·27	30·25	47	42	—	
	Full M.	30	SW	30·25	30·10	50	41	8	
12th Mo.		Dec. 1	SW	30·10	29·50	52	48	13	
		2	NW	29·86	29·50	52	34	8	15
		3	SW	29·86	29·32	50	40	13	4
		4	W	29·45	29·21	46	31	—	
		5	N	29·96	29·74	32	22	—	
		6	SW	29·74	29·56	50	28	15	
				30·41	29·21	55	22	1·49	1·41

Notes.—Eleventh Mo. 7. A calm pleasant day. 8. Cloudy, drizzling. 9. Wind, a. m. NW: a dripping mist: then clear and calm: *Cirrostratus*, evening: rain before nine the next morning. 10. *Nimbi* at sunset, with red haze on a brilliant twilight. 11. At sunset the clouds coloured in the E: a *Nimbus* in the W: windy night. 13. A clear sunset beneath dense clouds. 14. Windy, SW a. m. 15. Clear, windy: *Nimbi* at sunset to S. 18. Dripping mist. 19. Fair: *Cumuli* p. m., which evaporating at sunset, a beautiful red twilight ensued, with *Cirrostratus*. 20. Hoar frost and ice, the first this season: clear day, with *Cirrus* clouds: at sunset, the purplish haze of the dew was conspicuous, and the twilight of a rich crimson, with converging darker streaks upon it, probably the shadows of prominent objects on the earth. 21. Hoar frost: a *Stratus* in the evening. 22. Cloudy through the day in the superior atmosphere: twilight milky and luminous, with a blush of red. 23. Much rime on the grass, &c.: the sun emerged suddenly from the surface of a dense frozen mist, *Cirri* stretching from E to W, *Cirrostrati* and *Cumuli* beneath: the evening quite overcast. 24. Various modifications of cloud ending in *Cumulostratus*. 25. Morning twilight red. 26. Calm. lightly clouded. 27. Overcast: a few drops p.m. 29. At sunset, a *Stratus*, with a veil of superior clouds on the western sky richly coloured, the reflection from which gave considerable colour to the *Stratus* itself: wind above NW. 30. Cloudy. The weather has been calm since the 15th instant.

Twelfth Mo. 1. This morning the wind rose, bringing much cloud, with a few drops of rain: the night was stormy, and the evaporation was increased near sixfold: hence the formation of so great a mass of cloud, the superior atmosphere not being in a state to take up the water. 2. Rain commenced soon after 8 a.m.; about this time too the thermometer, which had been rising, began to fall; the barometer, which had been descending, to rise; and the wind, which had been SW, to go to the N. 3. Wind, a.m. fresh at SW: the sky overcast chiefly with *Cirrostratus:* stormy night: shower about 1 a.m., after which the wind abated. 4. Clear, windy a.m.: various clouds p.m. 5. Snow early this morning: wind N: evening twilight orange coloured, but with fainter horizontal streaks of cloud above it, which were also discernible at the ensuing sunrise, with *Cirrostratus* beneath: windy.

RESULTS.

Barometer:	Greatest height	30·41 in.
	Least	29·21 in.
	Mean of the period	29·898 in.
Thermometer:	Greatest height	55°
	Least	22°
	Mean of the period	42·95°
Evaporation		1·49 in.
Rain		1·41 in.

Wind chiefly SW and NW. The fore part of the period wet, the middle fair and tending to frost, the conclusion windy and changeable. There has been a strong tendency to the red refraction during twilight.

TABLE LXIV.

	1811.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
12th Mo.	L. Q.	Dec. 7	SW	29·56	29·35	54°	52°	—	—
		8	S	29·40	29·23	53	40	10	42
		9	SW	29·08	28·90	48	36	4	50
		10	Var.	29·67	29·08	41	32	—	2
		11	NW	29·96	29·67	45	32	—	—
		12	SW	29·96	29·86	49	33	—	1
		13	W	29·85	29·77	54	35	22	30
		14	SW	30·00	29·85	42	30	—	
	New M.	15	SW	30·00	29·50	47	35	—	18
		16	SW	29·58	29·39	42	36	—	1
		17	SW	29·86	29·58	40	31	—	
		18	SW	29·86	29·75	52	33	25	3
		19	SW	29·70	29·68	52	46	—	13
		20	W	29·68	29·60	53	49	—	16
		21	NW	30·15	29·60	49	27	—	3
	1st Q.	22	W	30·18	30·06	45	32	—	
		23	W	30·15	30·06	51	38	—	
		24	NW	30·19	30·15	43	28	—	5
		25	SE	30·20	29·98	39	24	—	
		26	SW	29·98	29·55	32	21	—	—
		27	NE	29·27	29·16	34	26	—	14
		28	NW	29·67	29·27	35	27	—	5
	Full M.	29	N	29·96	29·67	32	22	—	
		30	SW	30·08	29·96	30	25	—	
1812.		31	SW	30·08	29·88	35	31	—	
1st Mo.		Jan. 1	SW	29·88	29·70	43	34	—	
		2	S	29·70	29·56	48	31	—	
		3	S	29·55	29·46	44	29	—	3
		4	N	29·46	29·37	38	33	—	41
		5	NW	29·76	29·47	37	29	60	26
				30·20	28·90	54	21	1·21	2·73

NOTES.—Twelfth Mo. 7, 8. Much wind; showery. 9. The wind at 9 a. m. E, yet sounds came freely from the westward, together with the clouds. *Nimbi:* rainbow; showers through the day; a brilliant twilight. 10. A gale of wind a. m., then fair. 12. A dripping mist. 14. Clear day; an extensive redness on the twilight.

1812. First Mo. 2. About 10 a. m. there having been no rain for some days, a few light clouds, just formed, and coming from the westward, suddenly exhibited a segment of a rainbow, terminating above and below at the edge of the mass of cloud. As the latter advanced

NOTES, &c. *(continued).*

by the north, and became denser, the arch increased, and became at length nearly complete; the eastern extremity descending towards the earth, with the usual appearance of rain under the clouds. The western end now began to fade, and was soon reduced to a pale white, which gradually pervading the whole, the bow disappeared, having lasted about ten minutes. It afforded an example of rain, formed and propagated in the atmosphere with such rapidity, as scarcely to give time for the previous appearance of buoyant particles, in the form of cloud.

NOTES T. F's *Journal, Clapton.—December* 7. Misty and cloudy, with showers towards night, and strong wind. 8. Hazy and cloudy, rain at night. 9. Much rain with wind. 10. Windy with some rain, fair by night. 11. Wind gentle from NE, a balloon launched at 10 a. m. indicated an upper current from the east: *Cirrocumulus*, &c. cloudy night. 12. Yellow fog, afterwards cloudy and windy, with small rain. 13. Wind and small rain. 14. Clear morning, rain at night. 15. Cloudy and hazy; small rain. 16. Fair; wind very high; light showers. 17. Morning cool; evening warmer with small rain. 18. Cloudy and hazy all day, with very little wind; starlight at times by night. 19. *Cirri* and haze: cloudy. 20. Small rain: wind by night. 21. Cloudy, windy, hazy: some rain. 22. Fair day: various clouds: at night a *corona lunaris* coloured. 23. Various clouds: the atmosphere finely coloured at sunset. 24. Cloudy and hazy. 25. Clear, and a few light *Cirri*. 26. White frost and cloudy sky: some *Cirri*. 27. Cloudy, frosty: snow and rain. 28. Some snow toward evening. 29. Cloudy. 30. Clear, a. m. cloudy, p. m. 31. Cold, frosty, and cloudy morning: then warmer.

1812. *January* 1. Complete thaw. 2. Lofty *Cirri*, then showers. 3. Clear and showers: windy night. 4. Foggy. 5. Showery.

RESULTS.

Prevailing Winds Westerly.

Barometer:	Greatest height	30·20 in.
	Least	28·90 in.
	Mean of the period	29·708 in.
Thermometer:	Greatest height	54°
	Least	21°
	Mean of the period	38·06°
Evaporation		1·21 in.
Rain (including several products of snow)		2·73 in.

On the Inequality in the Products of the Rain Gauge at different Heights, and on the proper Situation for this Instrument.

It is a fact long established, that two rain gauges, placed at different heights, afford unequal products; the lower commonly yielding more than the higher. The following table gives the results of observations on this subject made during twenty successive days, on which rain fell at Plaistow; the elevation or depression of the *mean temperature* for the 24 hours, and direction of the prevailing wind being added.

Table of the Products of Rain in the Gauges No. 1 and 2, with the Changes of Wind and Temperature.

	1811.	Wind.	M.Tem.		Rain in		REMARKS.
			higher.	lower.	No. 1.	No. 2.	
10th Mo.	Oct. 24	Var.		5°	5	8	Misty rain about midday; little wind veering from SW to E.
	25	S		4	—	—	
	26	Var.	2°		45	50	Showers chiefly by night.
	27	SE	2		10	11	Rain by night.
	28	Var.		1	44	44	Clear a. m. with dew; *Nimbi;* vane SE, p. m. a heavy shower to S; wind veered by S to NW; then much cloud and rain.
	29	SW			18	18	Showers.
	30	Var.	2		8	14	Three currents in the air—see Journal under this date.
	31	W	3		13	14	Rain by night.
11th Mo.	Nov. 1	SW	6		5	11	Much cloud with a fresh breeze.
	2	SW		2	6	14	Cloudy; much wind; stormy night.
	3	SSW		4	6	8	Rain by night.
	4	W		2	—	—	
	5	SW		2	9	25	Stormy a. m.; wet p. m.
	6	SW			31	50	Showery day; *Cirrostratus* evening; wet night.
	7	NE		3	6	7	Rain by night.
	8	S	1		16	19	Cloudy; drizzling.
	9	Var.	3		29	34	
	10	SW		3	19	21	
	11	NW		3	1	3	Windy night; *Nimbus* at sunset.
	12	NW	2		11	22	Windy night.
					2·82 in.	3·73 in.	

The upper gauge, No. 1, is fixed on the NW angle of a glass turret, or observatory, on the house top, having a small vane and a conducting rod a few feet to the S and SE, but no other commanding object near it. The whole of the amounts of rain given in the tables in the *Athenæum* during 1807, 1808, and part of 1809, were obtained with this gauge. The gauge No. 2, the products of which I now prefer to register, is placed on a grass plot, about 70 feet from the west front of the house. Their difference in elevation is about 43 feet.

It appears, from the total result of these observations, that about one fourth of the rain which fell in twenty days was formed within 50 feet of the earth's surface.

In attending to the manner in which the rains fell, the cause of the frequent difference in the products of the gauges was, at times, obvious. When they were alike, the abundance and active appearance of the clouds in the higher atmosphere, together with the transparency of the lower, indicated that the whole supply might very well be derived from above. On the contrary, in several cases of excess in No. 2, the lower air was very turbid, showing that the decomposition of vapour was going on quite down to the surface of the earth; or, in other words, that the raining clouds, though not distinguishable as aggregates, to us who were enveloped in them, actually swept or rested upon that surface.

On the first day, when the products were 5..8, the mean temperature was lowered 5°, probably by the effect of the gentle easterly current, which decomposed the vapour near the surface. On the 28th of the tenth month, when the results were large and equal, a southerly current appeared to prevail in the region of the clouds, with, probably, a NW wind above it; by which the vapour coming from the south was decomposed. This was accomplished at a distance from the earth, and the mean temperature was lowered 1°. These two cases may elucidate the phenomenon without a long train of reasoning.

If we admit, that a portion of the atmosphere, contiguous to the earth's surface, may be so cooled by a superior portion moving in a different direction, or with a different velocity in the same, as to become filled with a fine mist, which is ultimately resolved into clouds and rain, we shall perceive, that a set of rain gauges, placed at various heights within this portion, ought to collect less and less rain, as we ascend; since each stratum of air deposits its own redundant water, and transmits that of the higher ones.

But if the source of the rain be in a middle current, the lower part of which is above all the gauges, they ought all to afford like quantities; unless, indeed, the lower air be so dry, at the same time, as somewhat to lessen the bulk of each drop by evaporation; in which case (as is said to have happened in some instances) the products will be found *larger* as we ascend.

But there is another source of discordant results, which seems not to have been enough attended to. It exists in the deflection of the rain by accidental currents. On the 25th of the ninth month, finding in the gauge No. 2, 0·46 of an inch, while No. 1 had only 0·12 of an inch, I suspected that the wind, which came in squalls from the W, had a share in producing the difference. I took, therefore, two other gauges, No. 3 and No. 4; and on the 27th, placed No. 3 in the gutter, near and on a level with the W parapet of the house; and No. 4 about 20 feet in a line to leeward, at the same height, but in the valley between the roofs. It was then beginning to rain in moderately large drops; the wind fresh at SW. After two hours and a half, I found in No. 3, 0·08, and in No. 4, 0·11 of an inch; No. 1, on the ground, having also 0·11 of an inch. I removed No. 4 about 40 feet to leeward, near the E parapet, and got in an hour and a quarter from No. 1, 0·08, No. 2, 0·15, No. 3, 0·12, No. 4, 0·14 of an inch. The rain continued six hours, with a steady wind, and was at times heavy: near twice as much fell on the ground gauge as on that at the turret; and the results of the other gauges proved, that some part of the difference must be attributed to the wind between these. For it appears, that the stream of air, obstructed by the W front of the house (which has a contiguous building fronting S,) and rising in a curve, carried with it a part of the rain over the windward gauge, to let it fall on the leeward; hence the latter had more than its due proportion, the former less.

Thus *rain may be drifted as well as snow:* and it will be found difficult to affix a gauge to any part of a building, so that its products shall not be affected by partial currents, diminishing or overcharging them; and allowance must doubtless be made in the results of the foregoing table for this source of error.

On the whole, as the proper subject of calculation and comparison is the rain on the surface of the ground, *this* is the proper ordinary situation for the gauge; and it should be as remote as possible from all objects that may give rise to eddies in the stream flowing over it. As a further defence, both from these and from sudden frosts, the bottle, into which the rain enters from the funnel, should be placed in a box, sunk in the ground; above which there should be a cavity sufficiently large to contain the funnel, with its mouth on a level with the ground, and a free space of a few inches round it: the whole being laid with turf, both to keep it neat, and to break the spray in heavy showers. A grass plot in a garden affords the greatest facility for this arrangement: and the instrument thus placed is scarcely discoverable from a moderate distance.

ERUPTION OF ÆTNA.

An eruption of Mount Ætna took place on the 27th of October. On the same day a great quantity of very fine pulverized cinders fell in Messina, a distance of 50 or 60 miles, and some were carried to a much greater distance.

STROKE OF LIGHTNING.

An instance of the remarkable effects of lightning occurred October 28, at 6 a.m. at Berkeley, near Frome. A single flash only was seen, followed almost instantly by a tremendous clap of thunder, and attended with a heavy storm of rain and hail: it struck two oaks at a short distance from the front of Berkeley-house, one of which was completely shivered to pieces, and even in some measure rooted up: every limb, twisted and torn in various ways, was blown off; fragments and splinters, from a very small to a very large size, were scattered about to the distance of 60 or 70 yards.

METEOR.

November 7.—At a quarter before 9 p.m. a splendid meteor illumined the visible horizon of the metropolis. It appeared above the loose clouds, through which Jupiter was scarcely perceptible, and passed over an extent of about 60° in the third of a minute. Its greatest altitude, when first distinguished, was about 18 or 20°, and it disappeared in the NNE part of the horizon. Its diameter was about the sixth of a degree, its mass compact, its light dense, and the colour on the ground and among the clouds was blue, such as is produced by the combustion of Roman candles. Its whole appearance was that of a magnificent rocket.

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Whitehaven.—On November 15, we were visited by one of the most awful tempests that has been witnessed here since the memorable month of January, 1796. Fortunately the tides were much lower last week than they were at the period alluded to; but the wind was far more violent than at that time, and from NNW, with little variation.—(PAPERS).

TABLE LXV.

	1812.		Wind.	Pressure,		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
1st Mo.	L. Q.	Jan. 6	NW	29·77	29·68	38°	31°	4	
		7	N	30·05	29·68	38	33	—	19
		8	NW	30·19	30·05	37	26	—	
		9	NW	30·18	30·10	37	31	—	
		10	Var.	30·18	30·13	36	32	—	12
		11	N	30·13	29·89	38	32	—	25
		12	N	29·89	29·79	42	32	—	
		13	NW	29·98	29·79	40	35	—	1
	New M.	14	NW	30·08	29·98	41	33	14	
		15	W	30·18	30·08	45	28	—	
		16	W	30·20	30·17	39	32	—	
		17	N	30·25	30·20	38	31	—	
		18	W	30·25	30·15	43	34	—	5
		19	SW	30·15	29·97	47	36	—	3
		20	NW	29·97	29·88	43	29	—	
	1st Q.	21	NW	29·88	29·86	40	28	33	
		22	NW	29·96	29·86	41	31	—	
		23	NE	30·08	29·96	34	31	—	
		24	NW	30·10	30·06	39	27	—	
		25	W	30·06	30·00	41	39	—	3
		26	S	30·07	30·05	45	31	—	
		27	SW	30·06	29·87	47	31	28	
	Full M.	28	Var.	29·87	29·46	46	36	—	
		29	SE	29·34	29·28	45	40	—	12
		30	S	29·79	29·34	50	33	—	24
		31	SE	29·79	29·79	48	41	29	10
2d Mo.		Feb. 1	SE	29·69	29·67	47	42	—	4
		2	SE	29·64	29·34	50	40	—	8
		3	SE	29·69	29·45	47	42	—	2
		4	SW	29·58	29·45	49	42	32	1
				30·25	29·28	50	26	1·40	1·29

NOTES.—First Mo. 6. Very fine morning: wet evening: the night stormy with much snow. 7. Snowy morning, stormy day. 9. Snow fell through the night, to about three inches depth. 10. Little wind, changing to SW: a thaw. London was this day involved, for several hours, in palpable darkness. The shops, offices, &c. were necessarily lighted up; but, the streets not being lighted as at night, it required no small care in the passenger to find his way, and avoid accidents. The sky, where any light pervaded it, showed the aspect of bronze. Such is, occasionally, the effect of the accumulation of smoke between two opposite gentle currents, or by means of a misty calm. I am informed that the fuliginous cloud was visible, in this instance, from a distance of forty miles. Were it not for the extreme mobility of our atmosphere, this volcano of a hundred thousand mouths would, in winter, be scarcely habitable! 16. A dripping mist. 18. Misty morning. 19. Very cloudy: large lunar halo: stormy night. 22. Snowy evening. 23, 24. Lunar halo. 28. Windy night. 29. Windy morning: wet evening.

Second Mo. 2. Gloomy, with small rain at intervals. About half past 7 p. m. the wind rose and blew furiously from E and SE for about an hour and a half, the barometer falling a quarter of an inch: after abating, the wind rose again, and the night was stormy.

NOTES T. F's *Journal, Clapton.—January* 21. Some *Cirri:* fair day. 22. Cloudy. 23. Fair. 24. Cloudy: fair: a fine coloured halo observed at Walthamstow. 25. Foggy: calm. 26. Foggy: then clear sky and misty horizon. 27. Hazy morning, windy night: corona, followed by halo. 29. *Cirri,* much coloured before sunrise. 30. Sun and mist: showers. 31. Cloudy, calm, and hazy.

February 1. Fair: much cloud. 2. Fair: *Cirrocumuli* and *Cumuli.*

RESULTS.

Winds from the N and W to the time of Full Moon, then from the Eastward.

Barometer:	Greatest height	30·25 in.
	Least	29·28 in.
	Mean of the period	29·899 in.
Thermometer:	Greatest height	50°
	Least	26°
	Mean of the period	38°
Evaporation		1·40 in.
Rain (including the products of snow)		1·29 in.

TABLE LXVI.

	1812.		Wind.	Pressure.		Temp.		Evap.	Rain &c.
				Max.	Min.	Max.	Min.		
2d Mo.	L. Q.	Feb. 5	SE	29·58	29·54	47°	41°	—	59
		6	NW	29·86	29·54	47	35	—	1
		7	W	29·86	29·70	47	37	—	11
		8	NW	29·96	29·86	41	36	28	10
		9	N	29·98	29·95	43	38	—	
		10	E	29·97	29·87	45	26	—	
		11	E	29·87	29·60	48	33	—	2
	New M.	12	S	29·54	29·45	50	39	—	4
		13	W	29·77	29·59	44	38	—	10
		14	Var.	29·65	29·48	48	39	—	24
		15	NW	29·69	29·65	47	41	48	5
		16	NW	29·75	29·66	49	45	—	14
		17	W	29·80	29·46	50	40	—	2
		18	NW	30·06	29·80	46	38	—	
	1st Q.	19	S	30·06	29·97	53	34	—	
		20	S	29·97	29·84	54	42	—	
		21	S	29·84	29·58	54	43	—	28
		22	Var.	29·59	29·55	50	41	55	32
		23	NW	29·75	29·49	50	31	—	1·08
		24	NW	29·95	29·76	44	34	—	
		25	S	29·40	29·30	44	32	—	12
		26	Var.	29·76	29·40	42	30	—	
	Full M.	27	Var.	29·76	29·70	50	31	—	6
		28	S	29·70	29·65	47	31	—	1
		29	E	29·65	29·55	48	37	67	3
3d Mo.		March 1	E	29·85	29·65	48	33	—	
		2	NW	29·97	29·90	46	25	—	1
		3	E	29·90	29·86	44	38	—	22
		4	SW	29·87	29 80	52	35	—	3
		5	Var.	30·04	29·75	47	36	30	13
				30·06	29·30	54	25	2·28	3·71

NOTES.—Second Mo. 8. Rainy evening. 10. clear p. m.: a fine blush on the evening twilight. 11. Hoar frost. 12. Stormy night. 14. Rainy morning: very stormy day. 16. Wind boisterous all night, with rain. 17. Stormy night. 20. A very fine day: lunar halo at night. 21. Cloudy: a heavy shower of hail about half past 9 p. m.: night stormy. 22. About 9 a. m. came on a great storm of wind and rain, mixed with hail, which continued about an hour: on its ceasing, the clouds dispersed and the wind changed to W. About noon it became again stormy, continuing so at intervals till half past four, when it began to hail with great violence; this was followed by rain, and during the storm there were frequent flashes of lightning and some distant thunder. 23. Cloudy: a large lunar halo: wind high in the night with rain. 24. Very stormy morning: heavy rain about 3. a.m. with the wind very strong from NW. In an hour after, snow and sleet, with a freezing air: clear evening: the moon bright. 25. Very stormy. 27, 28. Hoar frost. 29. Misty morning.

Third Mo. Fine, with occasional clouds. 3. Hoar frost: night rainy. 4 W tmorning. 5. Wet night.

RESULTS.

Winds Variable.

Barometer:	Greatest height	30·06 in.
	Least	29·30 in.
	Mean of the period	29·738 in.
Thermometer:	Greatest height	54°
	Least	25°
	Mean of the period	41·73°
Evaporation		2·28 in.
Rain		3·71 in.

THUNDER STORMS.

February 22, p. m.—The neighbourhood of Windsor was visited with a most dreadful storm, accompanied with vivid flashes of lightning and very loud claps of thunder.

Plymouth, February 24, 2 p.m.—There has been so dreadful a storm of thunder, lightning, and hail, for these two hours past, as has not been seen or heard in this port for a series of years.

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Thunder storms were very generally experienced throughout *France* in February, and, besides occasioning the loss of many lives, levelled many public buildings, houses, &c. On the night of the 23d, three vessels in L'Orient were sunk by thunder bolts.—The church of St. Pellerin, department of the Loire, was, on the 22d of February, struck by lightning, and burnt to the ground before the flames could be extinguished.

EARTHQUAKES IN NORTH AMERICA.

The American Papers abound with accounts of the recent earthquakes that have been experienced in different parts of the United States, (as it appears, in the month of December, and again in February.) Several islands in the Mississippi had totally disappeared, and the banks on both sides of that immense river had fallen in, to a prodigious extent.—(PAPERS).

TABLE LXVII.

	1812.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
3d Mo.	L. Q.	March 6	SW	29·88	29·84	56°	41°	—	
		7	NW	29·87	29·66	57	35	12	18
		8	NW	30·19	29·87	50	31	—	3
		9	NE	30·26	30·19	46	33	—	
		10	NE	30·26	30·20	44	30	—	
		11	NE	30·20	30·20	46	33	—	
		12	NW	30·20	29·96	44	34	—	12
	New M.	13	NE	29·99	29·96	45	34	—	6
		14	NE	29·99	29·87	44	26	—	4
		15	NE	29·87	29·76	42	31	48	1
		16	NE	29·77	29·75	35	31	—	
		17	NE	29·75	29·66	36	29	—	
		18	NE	29·66	29·40	39	26	—	
	1st Q.	19	E	29·40	29·30	39	29	—	14
		20	SW	29·24	29·10	50	40	—	8
		21	SE	29·54	29·24	54	39	30	18
		22	NE	29·74	29·54	53	39	—	2
		23	SE	29·74	29·27	42	40	—	67
		24	NW	29·64	29·27	40	32	—	16
		25	NE	30·27	29·64	42	24	—	1
		26	SE	30·35	30·17	46	30	—	
	Full M.	27	SE	30·20	29·46	51	41	36	16
		28	S	29·42	29·25	53	49	—	—
		29	SW	29·48	29·36	58	48	—	46
		30	SW	29·78	29·48	59	40	30	12
		31	E	29·53	29·48	47	40	—	10
4th Mo.		April 1	Var.	29·64	29·59	58	41	18	—
		2		29·70	29·58	—	—	—	—
		3		29·68	29·58	55	43	17	26
				30·35	29·10	59	24	1·91	2·80

NOTES.—Third Mo. 9. A shower of hail p. m. 11. Hoar frost. 15. Frosty morning. 16. Wind very strong from NE all day. 17. Cold wind. 20. Snow in the morning, followed by rain. 22. Very wet night; high wind. 25. Snow: the barometer rising rapidly. 26. Very fine a. m.: barometer still rising. 27. Cloudy a. m.: a considerable depression of the barometer, with appearances indicating thunder. Late at night a shower of hail, with lightning. 28. Stormy, with showers. 29. Windy a. m.: at 2h. 30m. p. m., the temperature without being 54°, I found the vapour point in a room as high as 51°. In an hour after this it began to rain steadily, and there fell near half an inch in depth. 30. Much wind, at intervals changing to E. 31. Stormy from E and SE: cloudy: about 9 p.m. an extensive appearance of light in the clouds to the W, with rapid coruscations passing through them, in the manner of an aurora borealis. This phenomenon was apparently not more elevated than the clouds which then overspread the sky, and was certainly not produced by the reflection of a light situate below them: it continued 20 or 30 minutes.

RESULTS.

Prevailing Winds Easterly.

Barometer:	Greatest height	30·35 in.
	Least	29·10 in.
	Mean of the period	29·739 in.
Thermometer:	Greatest height	59°
	Least	24°
	Mean of the period	41·5°
Evaporation		1·91 in.
Rain		2·80 in.

PARHELIA.

On the 9th March, was seen at Carlisle, the beautiful phenomenon of two *perhelia*, or mock suns, in the heavens. They were first observed about ten o'clock, and appeared of variable brightness until near twelve, when they vanished.

STORMS, SNOW, &c.

In consequence of the great inclemency of the weather, the mail due on the 21st March, from the north of Scotland, had not arrived at Edinburgh, nor the Glasgow at Carlisle.

Between Appleby and Brough, the snow had so much drifted as to make the road impassable for a coach.

Between Sheffield and Manchester, and Bradford and Halifax, the snow had drifted from two to three yards deep.—The mails have been also greatly impeded in South Wales; the snow and the floods having made the roads impassable.

Plymouth, March 21.—It blew a most tremendous gale from SW the whole of last night and this morning.

Hull.—On Friday, March 20, we experienced a most tremendous gale throughout the day and night; accompanied with heavy showers of snow and sleet. The accounts from the coast of the effects of the gale are highly disastrous. *During the storm, the wind to the southward of the Humber, was from the SW, whilst to the northward it was strong from the NE and by E.*

NOTES, &c. *(continued)*.

COLD IN ITALY, &c.

The cold has been more severe in Italy this winter than for many preceding ones. At Venice, Turin, Naples, &c. the thermometer placed in the sun, was in January 3° below freezing point. In the southern parts of Germany the winter has been extremely severe, while in the north it has been very moderate.—(PUB. LEDGER).

EARTHQUAKE IN SOUTH AMERICA.

A supplement to the St. Thomas's Gazette, of the 9th of April, contains the following particulars of this dreadful catastrophe.

The 26th of March has been a day of woe and horror to the province of Venezuela. At 4 p. m. the city of Caraccas stood in all its splendour—a few minutes later 4,500 houses, 19 churches and convents, together with all other public buildings, monuments, &c. were crushed by a sudden shock of an earthquake. That day happening to be Holy or Maundy Thursday, and at that precise hour every place of worship being crowded, to commemorate the commencement of our Saviour's Passion, by public processions, which were to proceed through the streets a few minutes afterwards, augmented the number of sufferers to an incredible amount; as every church was levelled with the ground before any person could be aware of danger. The number taken out of one church amounting (two days after the disaster) to upwards of 300 corpses, besides those (it may be presumed) that could not yet have been dug out of such heaps of ruins, gives an idea of the extent of the calamity. The number of dead are differently stated, from 4 to 6, as far as 8,000. Horrible as this catastrophe appears, it would be matter of some consolation to know that the vicinity of that city offered some support or shelter to the surviving mourners, but the next town and sea port thereto, *viz.* La Guira, has in proportion suffered still more; and that appears to have been the case along its immediate coast; huge masses of the mountains have been detached from the summits and hurled down into the vallies. Deep clefts and separations of the immense beds of rocks still threaten future disasters to the hapless survivors, who are now occupied to bury and burn the dead, and to relieve the numerous maimed, perishing for want of medical aid, shelter, and other comforts.

It appears, by authentic accounts, that several other cities and towns had suffered by the earthquake which destroyed Caraccas and La Guira:—Cumana, New Barcelona, and Valencia, are nearly destroyed; Barquisimeto, Santa Rosa, and Caudare, totally destroyed; Arilaqua, sunk; and the inland town of St. Philip, with a population of 1,200 souls, entirely swallowed up.—(PAPERS.)

The writer of a letter inserted in the public papers, (dated from Jocame, two leagues from Caraccas, March 31,) gives the following account of the state of the atmosphere at the time. " My first idea (on feeling the shock, which is stated to have lasted about 15 seconds) was that the Silla, a mountain near Caraccas, had broken out into a volcano: but its peak, like all the surrounding hills, was unusually clear: nor had there been any sultry weather or violent winds:—on the contrary, the weather has long been and still continues to be, warm without being sultry; though without rain for a considerable time, except now and then a few drops—and with very heavy night dews."

I may remark on the preceding statement, that probably it would have been happy for the city of Caraccas, had a volcano opened in its neighbourhood at this time. The celebrated *Humboldt*, whose opportunities of observing these phenomena have been most extensive, is clearly of opinion, that one and the same cause, deeply seated in the globe, produces both *earthquakes* and *volcanic eruptions*: he seems moreover to regard volcanoes as the *spiracula* through which the elastic vapours, occasionally disengaged in the bowels of the earth, find a vent into the atmosphere, without displacing the superincumbent strata. He considers the eruption in the island of St. Vincent, (for which see the Notes under next Table) as affording one example of this connection; as it began only 34 days after the present earthquake, and was long preceded by shocks, which were felt at the same time on the South American continent.

"We learned, says Humboldt, at Pasto, (120 miles N of Quito,) that a column of thick black smoke, which for several months in 1797, had been issuing from the volcano near that city, disappeared *at the very hour* when the cities of Riobamba, Hambato, and Tacunga were overthrown by an enormous shock, 60 leagues to the south of the volcano."—Voyage au Nouveau Continent: *Relation Historique, livre* 2, *chap. iv.*: which see throughout on this subject.

Supposing the prime agent in these phenomena to be *water*, penetrating to unusual depths through the inclined strata of mountainous countries, and thus meeting with masses of the highly oxidable bases of the earths, (for instance) which have not before undergone its action, there will then appear to be a close connexion between the recurrence of these effects and the variations of the atmosphere. For the most probable cause of such penetration, (though not the only assignable one) is excessive and continued *rain*; and this, not necessarily on the district which is the immediate seat of the earthquake, or eruption; but rather on some neighbouring mountainous tract, which by its position may be capable of collecting, and transmitting through subterraneous communications the requisite excess of water. Now the want of rain "for a considerable time" at Caraccas not only consists with, but even renders probable, an excess of it for the same period, in the more inland and elevated country.

TABLE LXVIII.

	1812.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
4th Mo.	L. Q.	April	4	E	30·10	29·60	53°	36°	—	
			5	S	30·18	30·10	56	35	—	4
			6	S	30·10	29·93	53	42	25	
			7	E	30·02	29·88	50	37	—	10
			8	NE	30·15	30·02	49	25	—	
			9	NE	30·15	30·01	43	33	—	
			10	NE	30·01	29·98	47	36	—	
	New M.		11	W	29·98	29·89	44	37	43	
			12	NE	30·05	29·89	52	32	—	
			13	NE	30·05	30·05	51	33	—	
			14	NE	30·05	29·91	51	32	—	
			15	NE	29·91	29·73	53	30	—	
			16	N	29·73	29·64	49	27	—	—
			17	N	29·83	29·64	48	28	—	—
	1st Q.		18	N	30·09	29·83	51	29	87	
			19	Var.	30·09	30·02	50	33	—	
			20	NW	30·15	30·00	58	30	—	—
			21	NE	30·15	30·07	58	37	28	
			22	N	30·01	29·97	54	30	—	
			23	—	—	—	52	32	—	
			24	W	29·94	29·86	52	36	—	
			25	SW	29·86	29·56	54	39	—	—
	Full M.		26	Var.	29·65	29·55	49	34	69	47
			27	NE	29·64	29·59	52	44	—	6
			28	NE	29·76	29·64	51	44	—	14
			29	NE	29·80	29·76	52	43	27	39
			30	Var.	30·02	29·80	55	45	—	—
5th Mo.		May	1	E	30·02	29·92	59	43	—	—
			2	NE	29·92	29·73	54	42	—	—
			3	Var.	29·75	29·70	56	32	55	4
					30·18	29·55	59	25	3·34	1·24

Notes.—Fourth Mo. 4. Cloudy a.m.: clear evening. 5. Much dew: barometer unsteady; heavy clouds through the day: a shower about sunset. 6. Much dew: grey sky, and the air nearly calm. 7. Lightly cloudy: little wind. 8. Cloudy a.m.: a shower p.m. 9. Brisk wind: cloudy. 10. Hoar frost. 11. Cloudy. 16. Slight showers. The *Cumulostratus* cloud has prevailed every day for a week past. 17. A little hail. 20. A few large drops. 23, 24. Occasional slight showers of hail, &c. 25. A rainy night. 26. Gentle showers of rain, yet not warm. 27. Misty morning: much dew: swallows appear. 28, 29. Cloudy: windy.

Fifth Mo. 1, 2. Cloudy: the cuckow heard. 3. About 1 p.m. a few drops of rain, attended with the smell of electricity in the air: the wind, which in the morning had been brisk at NE, died away, the canopy of the sky rose: the evening was calm, and dew fell.

RESULTS.

Prevailing Wind NE.

Barometer:	Greatest height	30·18 in.
	Least	29·55 in.
	Mean of the period	29·902 in.
Thermometer:	Greatest height	59°
	Least	25°
	Mean of the period	43·57°
Evaporation		3·34 in.
Rain		1·24 in.

It appears that a shower of *Meteoric Stones*, accompanied with the usual flashes and detonations, fell on the 10th of the Fourth month, about 8 p. m., at six leagues distance from *Thoulouse.*

ERUPTION OF THE SOUFRIERE MOUNTAIN, ST. VINCENT'S.

A letter of the 6th of May furnishes the following interesting particulars of this awful phenomenon :—" The Soufriere Mountain," says the writer, " had for some time past indicated much disquietude; and from the extraordinary frequency and violence of earthquakes, which are calculated to have exceeded 200 within the last year, portended some great movement or eruption. The apprehension, however, was not so immediate as to restrain curiosity, or to prevent repeated visits to the crater, which of late had been more numerous than at any former period, even up to Sunday April 26; when some gentlemen ascended it, and remained there for some time. Nothing unusual was then remarked, or any external difference observed, except rather a stronger emission of smoke, from the interstices of the conical hill at the bottom of the crater. About 2,000 feet from the level of the sea, (calculating from conjecture) on the south side of the mountain, and rather more than two-thirds of its height, opens a circular chasm, somewhat exceeding half a mile in diameter, and between 4 and 500 feet in depth: exactly in the centre of this capacious bowl, rose a conical hill about 260 or 300 feet in height, and 200 in diameter, richly covered and variegated with shrubs, brushwood, and vines, above half way up, and, for the remainder, powdered over with virgin sulphur to the top. From the fissures in the cone and interstices of the rocks, a thin white smoke was constantly emitted, occasionally tinged with a slight bluish flame. The precipitous sides of this magnificent amphitheatre were fringed with various evergreens and aromatic shrubs, flowers, and many Alpine plants. On the north and south sides of the base of the cone were two pieces of water, one perfectly pure and tasteless, the other strongly impregnated with sulphur and alum.

NOTES, &c. (*continued*).

"A century had now elapsed since the last convulsion of the mountain, or since any other elements had disturbed the serenity of this wilderness than those which are common to the tropical tempest. It apparently slumbered in primeval solitude and tranquillity, and from the luxuriant vegetation and growth of the forest which covered its sides from the base nearly to the summit, seemed to discountenance the fact, and falsify the records of the ancient volcano. Such was the majestic, peaceful Soufriere on April the 27th; but we trod on '*ignem suppositum cineri doloso*,' and our imaginary safety was soon to be confounded by the sudden danger of devastation. Just as the plantation bells rang 12 at noon, on Monday the 27th, an abrupt and dreadful crash from the mountain, with a severe concussion of the earth, and tremulous noise in the air, alarmed all around it. The resurrection of this fiery furnace was proclaimed in a moment by a vast column of thick black ropey smoke, like that of an immense glass house, bursting forth at once, and mounting to the sky; showering down sand, with gritty calcined particles of earth and favilla mixed, on all below. This, driven before the wind towards Wallibon and Morne Ronde, darkened the air like a cataract of rain, and covered the ridges, woods, and cane pieces with light grey coloured ashes, resembling snow when slightly covered by dust. As the eruption increased, this continual shower expanded, destroying every appearance of vegetation. At night a very considerable degree of ignition was observed on the lips of the crater; but it is not asserted, that there was as yet any visible ascension of flame. The same awful scene presented itself on Tuesday; the favilla and calcined pebbles still increasing, and the compact pitchy column from the crater rising perpendicularly to an immense height, with a noise at intervals like the muttering of distant thunder. On Wednesday the 29th, all these menacing symptoms of horror and combustion still gathered more thick and terrific, for miles around the dismal and half obscured mountain. The prodigious column shot up with quick motion, dilating as it rose like a balloon. The sun appeared in total eclipse, and shed a meridian twilight over us, that aggravated the wintry gloom of the scene, now completely powdered over with falling particles. It was evident that the crisis was yet to come—that the burning fluid was struggling for vent, and labouring to throw off the superincumbent strata and obstructions which suppressed the ignivomous torrent. At night it was manifest that it had greatly disengaged itself from its burthen, by the appearance of fire flashing now and then, flaking above the mouth of the crater.

"On Thursday, the memorable 30th of April, the reflexion of the rising sun on this majestic body of curling vapour was sublime beyond imagination—any comparison of the Glaciers of the Andes, or Cordilleras with it, can but feebly convey an idea of the fleecy whiteness and brilliancy of this awful column of intermingled and wreathed smoke and clouds: it afterwards assumed a more sulphureous cast, like what we call thunder clouds, and in the course of the day a ferruginous and sanguine appearance, with much livelier action in the ascent, a more extensive dilatation, as if almost freed from every obstruction—in the afternoon the noise was incessant, and resembled the approach of thunder still nearer and nearer, with a vibration that affected the feelings and hearing: as yet there was no convulsive motion, or sensible earthquake.—Terror and consternation now seized all beholders.—The Charaibs, settled at Morne Ronde, at the foot of the Soufriere, abandoned their houses, with their live stock and every thing they possessed, and fled precipitately towards town. The Negroes became confused, forsook their work, looked up to the mountain, and, as it shook, trembled, with the dread of what they could neither understand or describe—the birds fell to the ground, overpowered with showers of favilla, unable to keep themselves on the wing; the cattle were starving for want of food, as not a blade of grass or a leaf was now to be found—the sea was much discoloured, but in nowise uncommonly agitated; and it is remarkable, that throughout the whole of this violent disturbance of the earth, it continued quite passive, and did not at any time sympathize with the agitation of the land. About 4 p.m. the noise became more alarming, and just before sunset the clouds reflected a bright copper colour, suffused with fire. Scarcely had the day closed, when the flame burst at length pyramidically from the crater, through the mass of smoke; the rolling of the thunder became more awful and deafening; electric flashes quickly succeeded, attended with loud claps; and now, indeed, the hurlyburly began. Those only who have witnessed such a sight, can form any idea of the magnificence and variety of the lightning and electric flashes; some forked, zigzag, playing across the perpendicular column from the crater—others shooting upwards from the mouth like rockets of the most dazzling lustre—others like shells with their trailing fuses flying in different parabolas, with the most vivid scintillations from the dark sanguine column, which now seemed inflexible, and immovable by the wind. Shortly after 7 p.m. the mighty caldron was seen to simmer, and the ebullition of lava to break out on the NW side. This, immediately after boiling over the orifice, and flowing a short way, was opposed by the acclivity of a higher point of land, over which it was impelled by the immense tide of liquid fire that drove it on, forming the figure V in grand illumination. Sometimes when the ebullition slackened, or was insufficient to urge it over the obstructing hill, it recoiled back, like a refluent billow from the rock, and then again rushed forward, impelled by fresh supplies, and scaling every obstacle, carrying rocks and woods together, in its course, down the slope of the mountain, until it precipitated itself down some vast ravine, concealed from our sight by the intervening ridges of Morne Ronde. Vast globular bodies of fire were seen projected from the fiery furnace, and, bursting, fell back into it, or over it, on the surrounding bushes, which were instantly set in flames. About four hours from the lava boiling over the crater, it reached the sea, as we could observe from the reflection of the fire, and the electric flashes attending it. About half past one, another stream of lava was seen descending to the eastward, towards Rabacca. The thundering noise of the mountain, and the vibration of sound that had been so formidable hitherto, now mingled in the sullen monotonous roar of the rolling lava, became so terrible, that dismay was almost turned into despair. At this time the first earthquake was felt: this was followed by showers of cinders, that fell with the hissing noise of hail during two hours.

" At three o'clock, a rolling on the roofs of the houses indicated a fall of stones, which soon thickened, and at length descended in a rain of mingled fire, that threatened at once the fate of Pompeii, or Herculaneum. The crackling and coruscations from the crater at this period exceeded all that had yet passed. The eyes were struck with momentary blindness, and the ears stunned with the glomeration of sounds."—Another letter says, "The stones that fell were as light as pumice, though in some places as large as a man's head. This dreadful rain of stones and fire lasted upwards of an hour, and was again succeeded by cinders from three till six o'clock in the morning. Earthquake followed earthquake almost momentarily, or rather the whole of this part of the island was in a state of continual vacillation. The break of day, if such it could be called, was truly terrific—a chaotic gloom enveloped the mountain, and an impenetrable haze, with black sluggish clouds hung over the sea. The whole island was covered with favilla, cinders, scoriæ, and broken masses of volcanic matter. It was not until the afternoon that the muttering noise of the mountain sunk gradually into a solemn silence."

◆

The mountain continued to be agitated up to the 7th, when its more violent paroxysms gradually subsided; and it has since (to May 18) shewn scarcely any signs of commotion. By this dreadful calamity, the large rivers of Rabacca and Wallibou were dried (or choked) up, and in their places was a wide expanse of barren land. The melted minerals had formed a promontory which jutted out some distance from the main land, close to the post at Morne Ronde. The quantity of matter discharged from the crater is supposed to exceed twenty times the original bulk of this immense mountain. The soil, in many places, would be rendered incapable of vegetation. The extent of the planters' losses had not been ascertained; but it was thought to be very great.

◆

Barbadoes.—The following extracts relate to the fall of the volcanic matter on that island. "I was lying in bed about six o'clock in the morning, (May 1,) when I observed my chamber more dark than usual. (Another account states, that the atmosphere at *four* was light and clear.) Some time after I arose and opened one of my windows, when I observed *to the north a dark thick cloud,* similar to the usual indication of a great deal of rain (which would have been very acceptable,) but at the same time I perceived a most remarkable *bright cloud to the southward,* so much so, as to reflect light on the houses. We had had what we conceived to be several rolling claps of thunder during the night, and the last was a quarter past seven, when an instantaneous total darkness ensued, and from that time till one o'clock I never saw so dreadful a phenomenon. During the time of the darkness we were assailed by immense falls of calcareous matter (as I think) to such a degree that it was dangerous to go out of the house. At first, what fell was a large black substance, very coarse; but it gradually became as fine as Scotch snuff, and in a few hours the streets and the tops of the houses were many inches thick in this matter. About half-past one o'clock, a small glimmering of light began to appear, and by half-past two o'clock we could make out people in the streets. About half-past six last night, we saw like rays of fire in the southern quarter again. The whole island is in one complete sheet of this matter; the canes are all weighed down with it, and the poor cattle and horses must die for want, if we are not immediately relieved. We cannot see 20 yards before us for the immense volumes continually falling from off the tops of the houses; for so soon as it is dry, it is exactly like flour."

◆

A letter of the 5th, says:—"We learn, by arrivals, that the explosion has not taken place at Dominica, St Lucia, or Martinique. The Neptune arrived this morning from *Bristol*. Capt. Powers says, *he met with the volcanic matter 500 miles to windward of this island;* in that case, it is likely to be from the Western Islands."—(PAPERS).

◆

St. Vincent's (an island about 17 miles long, by 10 broad,) lies 20 leagues west, and somewhat south, of Barbadoes. The distance to which the *favilla* of this eruption was carried, and that in vast quantities, is truly astonishing. It reached Barbadoes about six in the morning on the fifth day of the eruption, and approached as it seems, *from the northward;* from which circumstance, as well as from its having been met with far in the Atlantic by a ship from Europe, the Barbadians might very well imagine it came from the *Azores*.—The facts are explicable on the supposition, that this matter was raised by the force of the explosion, as well as by the ascending heated column of air, quite into the superior current, which returns from the Equator to the Tropic, above the Trade wind: for *the latter*, blowing from Barbadoes to St. Vincent's, must have carried what was within its range towards *Grenada*, and we have no account of its even reaching that island, though nearer than Barbadoes to the volcano. By the superior current (which often moves with a velocity unknown in the lower atmosphere) it was probably carried over and beyond Barbadoes, appearing there at sunrise as a "bright cloud to the southward:" and falling soon after into the Trade wind, continued to be brought back to the island in the ordinary direction of that wind, until the supply from the volcano ceased.

TABLE LXIX.

	1812.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
5th Mo.	L. Q.	May 4	NE	29·86	29·78	63°	38°	—	
		5	E	30·01	29·86	64	40	—	
		6	E	30·01	29·98	60	42	—	
		7	E	29·94	29·86	58	45	70	
		8	SE	29·86	29·73	76	51	—	
		9	SW	29·78	29·68	72	53	90	—
		10	W	29·82	29·56	64	56	—	20
	New M.	11	NW	29·56	29·54	65	49	—	2
		12	SW	29·53	29·51	65	44	—	13
		13	S	29·56	29·50	60	40	44	15
		14	S	29·75	29·56	58	40	—	—
		15	NE	29·95	29·75	57	48	—	10
		16	N	30·00	29·95	62	45	36	2
		17	NE	29·95	29·87	53	45	—	7
	1st Q.	18	E	29·87	29·80	63	48	—	
		19	E	29·80	29·63	66	53	—	44
		20	SW			65	58	—	8
		21	Var.	29·94	29·63	61	45	—	60
		22	NW	30·18	29·98	52	35	—	
		23	E	30·27	29·98	61	40	32	
		24	SE	30·27	30·11	57	52	—	4
		25	SW	30·11	29·98	62	53	—	
	Full M.	26	SW	29·98	29·55	72	55	43	
		27	S	29·59	29·55	71	51	—	
		28	SE	29·69	29·59	69	54	—	14
		29	SW	29·84	29·69	72	53	—	23
		30	S	29·76	29·74	67	52	65	
		31	S	29·75	29·72	65	54	—	10
6th Mo.		June 1	SW	29·95	29·72	60	46	28	4
				30·27	29·50	76	35	4·08	2·36

NOTES.—Fifth Mo. 4, 5, 6. Much dew. 7. Windy. 8. Windy: *Cirrocumulus* and *Cumulostratus*: wind S above: thunder clouds: the evening twilight was luminous and coloured: the clouds dispersing, and scattered in loose flocks over the rich ground of the western sky, presented a striking appearance. 9. Shower very early: wind S, *Cirrus*, *Cirrocumulus*: evening, much wind. 10. Overcast a. m.: a gale from the W, with much cloud: showers: p. m. clear and pleasant. 11. A shower early: *Cumulostratus* prevails. 12. Showers. 13. A thunder shower, with hail about 3 p. m. 14. Showers. 15—17. Cloudy, windy. 18. Small rain a. m.: wind N, gentle: p. m. sunshine. 19. Wind

NOTES, &c. *(continued)*.

E a.m., pretty strong: clouds of different kinds, with haze above: p.m. thunder clouds: in the evening came on a violent thunder storm, which lasted several hours; it was chiefly to the S and W. The appearances were very similar to those of the destructive hail storm, which occurred here in the same month, and on the same day of the month, and nearly at the same time of the day in 1809: sheets of blue and white lightning came in quick succession, with an almost continual rolling of thunder. We had however no hail, (being only on the flank of the storm) but sudden and heavy showers of warm rain; which was of the same amount in the upper as in the lower gauge. At 11 p.m. wind NE, it still lightned far in the N. 20. Wind a.m. W, cloudy and misty. 23. About noon, during a shower, it thundered to the southward. 29. A little thunder to the SW about 4 p.m., with a few drops: wet night. 31. An electric shower about 9 a.m., *Nimbi:* windy night.

NOTES T. F's *Journal, Clapton.—May* 22. Cloudy morning, fair afternoon, with *Scud, Cumulus,* and *Cumulostratus.* 23. Various clouds in different heights. 24. Clouded sky with a little rain, a wavy, and in some places mottled appearance of the cloudy mass. 25. Small rain; fair evening. 26. Fine warm morning, *Cirrus,* &c., a sort of flying haze of a brownish colour here and there appeared in the afternoon. 27. Fine warm day and various clouds. 28. Clouds in two strata, some rain, fine sunset. 29. All the modifications appeared, and were followed by showers. 30. Some *Cirri* early, afternoon all the clouds were compact but rocky *Cumuli.* 31. Clouds in two strata, cloudy and rather windy by night.

RESULTS.

Winds Variable.

Barometer:	Greatest height	30·27 in.
	Least	29·50 in.
	Mean of the period	29·810 in.
Thermometer:	Greatest height	76°
	Least	35°
	Mean of the period	55·46°
Evaporation		4·08 in.
Rain		2·36 in.

TABLE LXX.

	1812.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
6th Mo.	L. Q.	June 2		29·98	29·95	68°	53°	—	
		3	NE	30·02	29·98	65	46	—	
		4		30·04	30·00	72	50	38	
		5	E	30·08	30·04	70	49	—	
		6	NE	30·18	30·08	66	45	—	
		7	NE	30·35	30·12	70	44	52	
		8	NE	30·40	30·35	62	46	—	
	New M.	9	N	30·40	30·15	66	51	—	
		10	Var.	30·27	30·17	65	43	36	
		11	NW	30·07	30·03	75	53	—	
		12	NW	30·03	29·93	74	48	38	
		13	SW	29·93	29·88	68	50	—	
		14	SW	29·88	29·81	69	49	—	
		15	SW	29·82	29·79	68	49	—	7
	1st Q.	16	SW	29·79	29·58	65	48	—	23
		17	SW	29·78	29·58	52	46	—	39
		18	SW	29·58	29·49	59	53	—	40
		19	SW	29·49	29·34	63	49	1·15	9
		20	SW	29·53	29·33	60	46	—	21
		21	SW	29·66	29·32	60	46	—	16
		22	SW	29·83	29·66	60	43	37	1
		23	W	29·94	29·81	62	46	—	5
	Full M.	24	SW	29·94	29·91	59	45	—	6
		25	Var.	29·91	29·60	63	50	—	25
		26	Var.	29·86	29·45	58	42	38	61
		27	Var.	29·86	29·78	63	46	—	22
		28	N	30·10	29·78	58	39	—	1
		29	SW	30·03	29·96	64	48	—	
		30	SW	29·86	29·70	62	52	60	5
				30·40	29·32	75	39	4·09	2·81

NOTES.—Sixth Mo. 3. A little rain at intervals. 4. A few large drops: *Cumulostratus* p.m. A shower to the SW. Wind E. 5. Much dew: clear with *Cirrus*. 6. Overcast, windy: then very fine, with red *Cirri* at sunset. 7. Cloudy morning: clear day afterward: brilliant orange twilight. 8. Cloudy: brisk wind. 9. Fair, with *Cumulus* and *Cirrus* above: at sunset the wind rose, with some appearance of *Nimbus*. 10. *Cumulostratus*, with a cold breeze all day. 11. Wind fresh at W a.m.: the maximum of temperature occurred at nine: the barometer fluctuating. *Cumulus* clouds, with very large plumose *Cirri* above, which showed red at sunset. The New Moon appeared (in a white crescent, becoming afterward of a gold colour) in the midst of a pretty luminous twilight. 12. Cloudy a.m.: barometer still unsettled: evening twilight luminous and orange coloured: a *Stratus* began to appear at 9 p. m. 13. Misty a. m.: much dew. 15. Cool day: rather windy. 16. Rain last night: fair and cool. 17. Heavy short showers. 18. Fair, cloudy: rain by night. 19. The rainbow *twice* this morning. 21. Several hours rain a. m. Barometer fluctuating. 22. *Nimbi* a. m., fair p. m. 23. *Nimbi* through the day: thunder twice to the SW: the wind veered as far as to NW, but settled W. 24. Much cloud a. m.: calm air: showers. 25. *Cumulus*, with very elevated *Cirrus* in parallel bands E and W. A solar halo for above two hours after noon, the higher atmosphere filled with cloud: at sunset the wind, which had been SE and SW, came to NW. 26. Cold stormy morning, wind N. Thunder twice about 2 p. m.: rain almost from sunrise to sunset. 27. Sunshine a. m.: wind NW: a solar halo p. m.: wind SW: evening wet and stormy. 28. Wind N a. m.: a faint blush on the evening twilight. 30. Windy evening: rain at intervals.

RESULTS.

Winds Variable, the SW of longest continuance.

Barometer:	Greatest height	30·40 in.
	Least	29·32 in.
	Mean of the period	29·881 in.
Thermometer:	Greatest height	75°
	Least	39°
	Mean of the period	55·87°
Evaporation		4·09 in.
Rain		2·81 in.

THUNDER STORM.

June 21.—South End, in Essex, and the neighbourhood for several miles round, were visited by a severe storm of thunder and lightning, accompanied by a shower of hail stones of uncommon size.

ERUPTION OF VESUVIUS.

Naples, June 15.—Vesuvius, which had been quiet for several years, has suddenly broken out. At nine in the morning of the 12th, loud reports proceeded from the bosom of the mountain, followed by an eruption of cinders and smoke. After this the mountain remained quiet for an hour. At 11 two fresh reports were heard, when the crater vomited fire and smoke, which covered the horizon. On the 13th and 14th, it was calm, but, at the instant we are writing, it is again in action, and its crater is covered with an immense column of smoke.

AGITATION OF THE SEA.

Marseilles, June 24.—A singular phenomenon was witnessed here yesterday. On a sudden, a rush of water came from the sea into the port, forming a current so rapid that it drew every thing with it. The sea then retired all at once, leaving the harbour dry, and all the vessels aground. Almost at the same instant the sea returned by leaps and bounds, with extraordinary impetuosity, filling again the harbour, placing afloat the vessels, and inundating the quays. Afterwards every thing returned to its usual state.—(PAPERS).

TABLE LXXI.

	1812.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
7th Mo.	L. Q.	July 1	SW	29·70	29·44	63°	52°	—	29
		2	Var.	29·56	29·40	65	47	—	53
		3	N	30·00	29·56	61	42	—	
		4	SW	30·05	30·01	61	42	45	
		5	SW	30·02	29·96	63	51	—	
		6	NW	30·27	30·02	67	50	—	
		7	N	30·29	30·27	72	51	43	
	New M	8	E	30·33	30·29	71	46		
		9	NE	30·33	30·29	73	50		
		10	N	30·39	30·29	72	51		
		11	N	30·29	30·16	69	54		
		12	NW	30·17	30·16	66	41		
		13	NW	30·19	30·16	64	52		
		14	Var.	30·19	30·17	64	46		4
		15	Var.	30·17	30·05	69	50		1
	1st Q	16	E	30·05	29·95	65	55	—	
		17	Var.	30·14	29·95	67	56	—	
		18	SE	30·10	30·00	75	56	37	
		19	SW	30·00	29·74	73	55	—	17
		20	W	29·85	29·70	75	50	—	34
		21	W	29·96	29·94	65	45	35	
		22	SW	30·09	29·96	63	42	—	15
		23	SW	30·09	29·94	65	52	—	
	Full M.	24	SW	29·94	29·78	62	58	—	26
		25	SW	29·79	29·78	71	57	55	3
		26	NW	29·85	29·79	68	49	—	
		27	Var.	29·66	29·60	61	48	—	1·00
		28	SW	29·66	29·65	64	50	—	
		29	W	29·80	29·66	63	49	55	22
				30·39	29·40	75	41	2·70	3·04

NOTES.—Seventh Mo. 1. Much wind: very cloudy: rain at intervals through the day and night. 2. Fair a. m.: thunder showers with hail, p. m. 3. Cloudy: a few drops of rain. 4. The wind veered gradually from N by E to SW. 5. Wind moderate. 22. Thunder and hail.

NOTES J. G.—*Stratford, July* 1. Rainy morning. 2. A shower of large hail between 5 and 6 p. m., with some thunder: evening showery. 5. Cloudy and fine: some rain in the evening. 12. Cloudy morning. 19. Some rain in the evening. 20. Some thunder in the afternoon: frequent lightning in the evening. 22. A heavy thunder storm about noon, accompanied with large hail. 27. Very rainy day. 29. A thunder storm about 3 p. m., with heavy rain mixed with hail.

RESULTS.

Winds Variable.

Barometer:	Greatest height	30·39 in.
	Least	29·40 in.
	Mean of the period	29·975 in.
Thermometer:	Greatest height	75°
	Least	41°
	Mean of the period	58·34°
Evaporation (in 21 days, the rest being lost by accident)		2·70 in.
Rain		3·04 in.

In travelling at different intervals during this month between London and Folkstone, I have observed that the showers in great measure avoided the high chalky tracts, and followed the course of the rivers and moist valleys. The reverse distribution sometimes takes place.

Being on the heights above Folkstone, Kent, about 10 p. m. on the 14th of seventh month, I observed a brilliant meteor dart down in the southern sky, tending a little E in its fall; during which it was of a bright blue, but at the moment of extinction it became red and seemed to explode.

WATER SPOUT.

July 22.—The inhabitants of Cromer were gratified by the appearance of a water spout, which continued in sight for some minutes, when the mass or column of water collected between a cloud and the surface of the sea broke in the offing, without doing any injury to the shipping.

STORMS IN DORSETSHIRE.

On Wednesday the 29th July, a man was struck by lightning at Aston Pits, near Newport, in this county, and very dreadfully burnt. The same day there were very heavy storms of thunder and lightning in that neighbourhood.—During the present week much injury has been done to the growing crops in various parts of this county, and the vicinity of Pool, by violent torrents of rain.—(PAPERS).

TABLE LXXII.

	1812.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
7th Mo.	L. Q.	July 30	NW	29·96	29·80	61°	46°		
		31	SW	29·96	29·80	64	51	20	8
8th Mo.		Aug. 1	Var.	29·86	29·80	61	53	—	2
		2	NE	29·86	29·80	64	54	—	10
		3	Var.	29·85	28·80	63	52	—	2
		4	NE	29·90	29·85	65	50	—	32
	New M.	5	SW	29·95	29·90	57	50	29	23
		6	Var.	30·00	29·95	63	47	—	41
		7	NW	30·00	29·95	61	49	—	
		8	NW	29·96	29·94	57	51	17	3
		9	NW	29·97	29·96	57	45	—	
		10	NW	29·97	29·96	58	53	—	2
		11	Var.	30·07	29·96	63	49	—	5
	1st Q.	12	NE	30·14	30·07	57	44	18	
		13	N	30·15	30·14	64	43	—	
		14	NE	30·15	30·12	67	49	—	
		15	E	30·12	30·07	65	50	—	
		16	E	30·06	30·05	68	54	34	
		17	SE	30·05	29·98	73	55	—	
		18	SE	29·98	29·76	78	58	—	
		19	SW	29·96	29·76	72	55	56	1
	Full M.	20	W	30·00	29·98	71	55	—	
		21	SW	29·97	29·94	69	57	—	
		22	W	30·05	29·97	68	53	—	
		23	SW	30·04	29·86	70	60	6	
		24	SW	30·10	29·86	66	47	—	5
		25	SW	30·10	30·04	69	52	—	
		26	NW	30·04	29·96	67	53	35	
		27	NW	29·99	29·96	69	51	—	
		28	NW	29·99	29·98	59	48	17	—
				30·15	29·76	78	43	2·92	1·34

NOTES.—Eighth Mo. 4. Wet afternoon. 5. Wet morning. 6. "The day was gloomy: about 4 p. m. a very heavy shower commenced, which continued for about 20 minutes, then abated for a short time, but increased again, and continued all the evening, with thunder and lightning: the barometer was nearly stationary." Such were the phenomena at the laboratory, where there fell 1·39 inch of rain. At Plaistow, two miles distant, there appears to have fallen only 0·41 inch of rain, and I find only this note, "Thunder in the afternoon." 13. Foggy morning: a *Stratus* at night. 14. The same.

NOTES, &c. *(continued).*

17. The same: lunar halo. 18. Some lightning during the night. 21. Thunder between 1 and 2 p. m. 24. Bright moonlight. 28. The wind this night very high.

RESULTS.

Winds Variable.

Barometer:	Greatest height	30·15 in.
	Least	29·76 in.
	Mean of the period	29·968 in.
Thermometer:	Greatest height	78°
	Least	43°
	Mean of the period	57·83°
Evaporation		2·92 in.
Rain		1·34 in.

METEORIC STONES IN INDIA.

The India Papers contain an account of the descent of two huge masses of stone in the neighbourhood of Lahore, accompanied by a series of explosions resembling the discharge of cannon;—a phenomenon, which had excited the utmost consternation throughout the country.—A meteoric stone also fell on the 6th of August, (1812?) near the British lines at Punderpoor. It weighed four pounds, was very heavy for its size, being impregnated with iron, and coated with a thin black crust, as if gunpowder had exploded round it. The ground where it fell was an open space, near the village of Kokurrgam, and by the rapidity of its descent, it was buried a foot deep in the earth. It was picked up by a native of rank, and was, with the greatest difficulty obtained by Captain M., as the possessor, *conceiving that it was of heavenly fabrication, had determined to repeat his prayers to it thrice a day.*——(P. LEDGER, *Oct.* 1813.)

Compare this with the worship paid by the Ephesians to the *Diopetous*, (that which fell from Jupiter) as mentioned Acts xix. v. 35: where note, that the word *image* is supplied in the translation, leaving it probable from the original, that it was in fact *a Meteoric Stone.*—L. H.

TABLE LXXIII.

	1812.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
8th Mo.	L. Q.	Aug.	29	NW	29·99	29·98	54°	52°	—	16
			30	NE	30·04	29·99	61	53	—	14
			31	N	30·15	30·04	60	48	26	
9th Mo.		Sept.	1	NE	30·18	30·15	59	48	—	
			2	SE	30·15	30·10	62	54	—	
			3	SW	30·10	29·95	62	53	—	
			4	SE	29·95	29·89	63	45	—	
	New M.		5	NE	29·96	29·89	65	46	28	
			6	NE	30·07	29·96	67	40	—	
			7	SE	30·09	30·07	67	41	—	
			8	E	30·07	29·97	69	50	—	
			9	SE	29·99	29·97	68	47	41	
			10	S	30·17	29·95	67	47	—	
	1st Q.		11	NW	30·28	30·17	68	42	—	
			12	W	30·26	30·22	69	44	—	
			13	Var.	30·18	30·14	71	42	—	
			14	Var.	30·18	30·07	69	40	53	
			15	NW	30·07	29·94	68	41	—	
			16	SW	29·94	29·82	72	47	—	
			17	Var.	29·96	29·82	62	41	—	15
	Full M.		18	NW	30·20	29·96	60	97	—	
			19	SW	30·14	30·12	60	46	48	
			20	SW	30·12	30·03	69	45	—	
			21	W	30·03	29·97	73	47	—	
			22	SW	29·95	29·91	68	50	—	34
			23	SW	29·95	29·93	57	44	57	
			24	NW	30·06	29·95	56	34	—	
			25	Var.	30·04	29·99	60	40	—	
			26	W	30·07	30·04	63	53	23	
					30·28	29·82	73	34	2·76	79

Notes.—Eighth Mo. 30. Very showery. Between 4 and 5 p.m. a *tornado* (as it seems by the description given) crossed the village of Plaistow, in a direction from NE to SW, which left behind it considerable traces of its violence: a large quantity of wheat in sheaves was carried over a hedge into a neighbouring field: a fence was levelled, and about seventy *oak hurdles* torn out of the ground, some of which were seen tumbling over in the air, and fell at two hundred yards distance.

Ninth Mo. 12. Misty morning: much dew. 13, 14. The same in the evening, a dense *Stratus* reflecting on its surface with much

NOTES, &c. (*continued*).

brilliancy the orange colour of the western sky. 15. Hoar frost in the pastures: a *Stratus* at night as before, the wind coming about to the eastward soon after it was formed. 16. *Cirrus*, with *Cirrostratus* and *Cumulus*. 17. Rain most of the afternoon: a rich crimson tinge on the lower surface of the clouds at sunset. 18. At sunset the sky was extensively coloured with orange, surmounted by a distinct blush of red: the colour was reflected in the E horizon. 19. Much hoar frost. 22. Clear morning at first, but soon overcast, with rain. 25. Hoar frost. 26. *Cirrostratus*.

RESULTS.

Easterly Winds prevailed the fore part, and Westerly the latter part, of this period.

Barometer:	Greatest height	30·28 in.
	Least	29·82 in.
	Mean of the period	30·040 in.
Thermometer:	Greatest height	73°
	Least	34°
	Mean of the period	54·93°
Evaporation		2·76 in.
Rain		0·79 in.

FALL OF A PRECIPICE.

An avalanche occurred on the 4th of September, in the neighbourhood of Villeneuve, Switzerland. A part of the eastern chain of the Fourches, which had been sapped by a stream that ran at the base, suddenly fell with a terrific noise. About 30 cottages were buried beneath the ruins, and 12 of their inmates killed. The noise of the avalanche was heard at the distance of six miles.

EARTHQUAKE.

Shocks of an earthquake were felt throughout Italy on the 11th and 12th of September. At Florence, several houses, public edifices, and two churches were thrown down. The inhabitants, under the influence of extreme terror, fled into the country, and the greater part of the population abandoned their homes, and passed two days and nights in the fields.—(PAPERS).

TABLE LXXIV.

	1812.			Wind.	Pressure.		Temp.		Evap.	Rain &c.
					Max.	Min.	Max.	Min.		
9th Mo.	L. Q.	Sept.	27	SW	30·04	29·77	68°	59°	—	4
			28	SE	29·90	29·67	63	53	—	—
			29	NE	29·90	29·90	57	55	—	—
			30	E	29·90	29·75	59	55	20	—
10th Mo.		Oct.	1	W	29·92	29·75	62	48	—	28
			2	W	29·98	29·92	64	48	—	1
			3	SE	29·98	29·90	61	41	2	9
			4	SW	29·90	29·78	67	44	—	
	New M.		5	NW	29·78	29·81	69	55	—	23
			6	SE	29·32	29·12	64	41	—	22
			7	Var.	29·32	29·12	57	45	—	5
			8	SE	29·40	29·32	62	40	—	6
			9	NW	29·40	29·35	53	46	13	7
			10	S	29·35	29·28	55	43	—	32
			11	W	29·28	29·23	53	38	—	6
			12	Var.	29·23	29·16	51	37	—	8
	1st Q.		13	SE	29·16	28·83	57	45	—	60
			14	SW	29·14	28·83	51	42	3	10
			15	W	29·39	29·14	53	45	—	—
			16	W	29·56	29·39	56	34	—	—
			17	SW	29·56	29·05	55	39	—	29
			18	W	29·17	28·74	61	50	—	44
			19	SW	28·81	28·53	59	49	9	37
	Full M.		20	NW	29·54	28·81	67	42	—	—
			21	NW	29·74	29·50	53	37	—	
			22	SW	29·45	29·35	59	46	—	2
			23	W	29·92	29·45	54	41	10	
			24	SW	29·92	29·74	56	41	—	—
			25	SE	29·50	29·40	56	41	—	31
			26	SW	29·74	29·72	53	38	6	—
					30·04	28·53	69	34	63	3·64

NOTES.—Ninth Mo. 26. Windy. Some rain in the night. 27. Very foul sky a. m. 28—30. Rain at intervals in very small quantity.

Tenth Mo. 1. A thunder storm about 1 p. m., which was chiefly in the W, with heavy showers. 4, 5. Much dew. A storm of wind about midnight on the 5th. 6. Windy. 7. Misty morning: the trees dripping. 8. Rainbow, several times repeated between 8 and 9 a. m. Showers followed. 10. Rainbow, p. m. 11, 12. Rain in the night, misty morning. 13. *Cirrostratus* and *Nimbus* a. m., sunshine, and showers: a wet night. 16. Sunshine, with *Cumulostratus*. 17. Misty morning. 18. Squally during the night, with heavy showers.

19. Thunder and lightning about 2 p. m. Very heavy squalls with rain. 20. Sunshine a. m., much wind. 21. Clear and calm this evening. 22. Overcast, windy a. m. In the evening a wet squall, with some lightning. 24. No swallows have been seen since the 19th or 20th. 25. A few swallows appeared again to-day.

RESULTS.

Prevailing Winds Westerly.

Barometer:	Greatest height	30·04 in.
	Least	28·74 in.
	Mean of the period	29·468 in.
Thermometer:	Greatest height	69°
	Least	34°
	Mean of the period	51·46°
Evaporation		0·63 in.
Rain		3·64 in.

The evaporation was much greater during the above period than the amount here stated, as appears by observations at the laboratory. It was probably not less than two inches. The situation of the gauge had been changed.

HURRICANE AND EARTHQUAKE AT JAMAICA.

Kingston, Jamaica, October 17.—During the greater part of Monday, there was a considerable fall of rain, with a heavy swell from the southward, and strong indications of an approaching storm. Between the hours of six and seven of that evening the wind began to blow with great violence, and about midnight had increased to a perfect hurricane, the sea being at the same time dreadfully agitated, passing over the different wharfs, and sweeping every thing in its overwhelming course. The weather continued in this boisterous state until eight o'clock next morning, when the fury of the wind considerably abated, and copious torrents of rain fell during the remainder of that day.

October 24.—We are concerned to state, that the accounts received this week from various parts of the country, furnish melancholy details of the damage sustained in consequence of the late tempestuous weather.—At Salt-hill, (parish of Port Royal,) a piece of about 16 acres of land, with a small house on it, sunk down, *and was afterwards swept to the distance of* 3 *or* 400 *yards from its original situation,* without occasioning any injury to the house.

November 14.—On Wednesday morning, at 20 minutes past two o'clock, a smart shock of an earthquake was felt in this city and neighbourhood; and at ten minutes before six three most alarming and tremendous concussions immediately succeeded each other, accompanied by a most dreadful rumbling noise and crash, and continuing for upwards of 30 seconds. The shock was felt throughout the whole island, and many houses and plantations suffered severely.—The watchman at the dock yard, *a few minutes previous to the shock, observed a large meteor,* which passed in a direction from the SE to the NW. The shock is stated to have lasted one minute and some seconds.—(PAPERS).

TABLE LXXV.

	1812.		Wind.	Pressure, Max.	Pressure, Min.	Temp. Max.	Temp. Min.	Evap.	Rain, &c.
10th Mo.	L. Q.	Oct. 27	SW	29·40	29·24	52°	40°	—	26
		28	SW	29·75	29·40	51	32	—	
		29	W	29·80	29·74	49	33	·15	
		30	SE	29·78	29·66	51	39	—	14
		31	W	29·94	29·78	54	41	—	
11th Mo.		Nov. 1	SW	29·94	29·87	55	50	—	—
		2	N	30·05	29·87	54	44	7	65
		3	SW	—	—	49	38	—	
	New M.	4	W	30·05	29·83	48	39	8	
		5	NW	29·83	29·80	49	30	—	
		6	SW	29·83	29·80	45	27	—	
		7	W	29·83	29·79	45	24	—	
		8	E	29·79	29·77	40	27	5	
		9	E	—	—	46	39	—	
		10	NE	30·15	30·03	45	33	—	
		11	SE	—	—	46	39	—	32
	1st Q.	12	E	30·03	29·58	45	39	—	38
		13	NE	29·58	29·20	51	44	—	55
		14	W	29·59	29·20	52	40	—	—
		15	SW	29·59	29·30	52	39	—	3
		16	NE	29·30	29·00	46	42	—	—
		17	NE	29·00	28·96	46	40	—	—
	Full M.	18	NW	29·66	28·96	42	32	7	13
		19	N	29·86	29·66	42	28	—	
		20	N	29·97	29·83	41	33	—	—
		21	NE	30·32	29·97	39	26	7	
		22	N	30·38	30·31	43	25	—	
		23	SW	30·31	30·08	44	26	—	
		24	SW	30·08	29·89	48	39	9	
				30·38	28·96	55	24	0·58	2·46

NOTES.—Tenth Mo. 27. Misty and overcast, a. m.: wet at noon: p. m. the barometer descended at the rate of a tenth of an inch per hour, the wind increasing in proportion, with much rain, the clouds sweeping the earth. The evening was very tempestuous; before midnight the barometer had risen again, and the weather was moderate. Many large trees were blown down. 28. Hoar frost: rather misty. At sunset, the sky exhibited a fine collection of coloured clouds, in the modifications *Nimbus* and *Cirrus*, with broad parallel bands of red in the haze above them. 28. Fair and calm. 30. *Cirrostratus* and *Cumulus*: the sky again beautifully coloured.

NOTES, &c. (*continued*).

Eleventh Mo. 1. Cloudy. 2. Wet a.m. 5. Fine day. 6—11. Chiefly misty or cloudy, with hoar frost, and some very thick local fogs. 11. Overcast a.m. The *Cirrostratus* prevails, and sounds travel with the wind to an unusual distance: we hear the rattling of the carriages on the pavement in London, through a direct mean distance of five miles. This phenomenon is perhaps to be attributed to a thick continuous sheet of haze in the air above us, which acts as a sounding board. 12. Rain through the day. 13. Misty: rain: sounds are again distinctly heard from the city. 15. Fair: a *Stratus* at night. 16. Overcast; with an easterly gale. 18. Wet stormy day, night clear and calm. 20. Misty, much rime on the trees, which came off about noon in showers of ice. At 11 a.m. a perfect but colourless *bow* in the *mist*: near 4 p.m. there was a shower, in which the rainbow showed its proper colours. 22. Clear: the ground just sprinkled with hail balls. 23. Misty a.m. with rime; clearer p.m.: thaw in the night. 24. Clear morning.

RESULTS.

Winds for the greater part Westerly; though the Rain chiefly fell during an Easterly Wind.

Barometer:	Greatest height	30·38 in.
	Least	28·96 in.
	Mean of the period	29·678 in.
Thermometer:	Greatest height	55°
	Least	24°
	Mean of the period	41·31°
Evaporation		0·58 in.
Rain		2·46 in.

A RIVER CHANGING ITS COURSE.

From the year 1750, the North Esk, in Kincardineshire, emptied itself into the sea upon the lands of Kirkside and Woodstone. About a twelvemonth ago, however, in consequence of an overflow in the river, and a very high tide, it excavated a new channel on the lands of Comieston, upon which, on an average, one half of its contents continued to run during last fishing season. A new revolution has now taken place in the course of the river, which, on Monday last, completely opened out its old channel upon the lands of Kirkside and Woodstone, by which a valuable property it restored to its former proprietors. This river had, several times previous to the first-mentioned date, undergone a similar change from the same causes; and, upon one of these occasions, it gave rise to a long and expensive litigation between the new and old proprietors, which was, at last, decided in favour of the gentleman on whose grounds the river had begun to flow; all artificial means employed to obstruct or change the course of a river being declared illegal.—(PUB. LEDGER, *Nov.* 2).

TABLE LXXVI.

	1812.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
11th Mo.	L. Q.	Nov. 25	SW	29·89	29·80	48°	35°		
		26	E	30·07	29·77	47	43		26
		27	N	30·21	30·10	49	42		
		28	NE	30·10	29·92	47	38		
		29	SE	29·89	29·85	49	41		
		30	S	29·95	29·88	50	47		15
12th Mo.		Dec. 1	S	29·96	29·72	52	44		5
		2	NW	30·08	29·96	49	42		—
	New M.	3	E	30·11	30·09	49	45		—
		4	E	30·08	30·05	48	38		11
		5	E	30·22	30·08	44	33		
		6	NE	30·51	30·29	42	26		
		7	NE	30·51	30·41	35	23		
		8	NE	30·41	29·94	34	18		
		9	W	29·96	29·94	35	24		
		10	NW	29·89	29·78	34	29		—
	1st Q.	11	E	30·00	29·97	36	27		
		12	NE	29·97	29·79	32	24		
		13	NE	29·79	29·71	34	24		
		14	NE	29·71	29·66	35	28		
		15	E	29·66	29·20	34	28		
		16	E	30·20	28·98	34	28		—
		17	E	30·22	28·98	35	32		27
	Full M.	18	E	29·51	29·22	38	33		18
		19	E	29·57	29·47	38	35		
		20	E	29·76	29·57	36	31		
		21	NW	29·82	29·76	38	32		—
		22	Var.	30·02	29·82	42	33		—
		23	N	30·30	30·02	36	31		—
		24	N	30·46	30·30	35	32		3
				30·51	28·98	52	18		95

Notes.—Eleventh Mo. 28. The sky, about sunset, was overspread with *Cirrus* and *Cirrostratus* clouds, beautifully tinged with flame colour, red and violet. 30. The sky again much coloured in the morning.

Twelfth Mo. 5. The weather, which has been hitherto mostly cloudy, with redness at sunrise and sunset, begins now to be more serene. 6. Hoar frost. 7. A little appearance of hail balls on the ground. 8, 9. Clear, hoar frost. 11. Snow this morning, and again after sunset. 13. An orange-coloured band on the horizon this evening; this phenomenon arises from reflection by the descending dew.

Notes, &c. *(continued).*

15. A gale from NE, unaccompanied by snow, came in early this morning. 16. a.m. The wind has subsided to a breeze, and there now falls (at the temperature of 27·5°) snow, very regularly crystallized in stars. 17. a.m. It snowed more freely in the night, and there is now a cold thaw, with light misty showers. 18. A little sleet, followed by snow. Ice has been formed in the night, by virtue of the low temperature which the ground still possesses. A wet evening. 21. A little rain, a.m. 22. A dripping mist. 24. Cloudy; a little rain; some hail balls in the night.

RESULTS.

Prevailing Winds Easterly.

Barometer:	Greatest height	30·51 in.
	Least	28·98 in.
	Mean of the period	29·882 in.
Thermometer:	Greatest height	52°
	Least	18°
	Mean of the period	36·68°
Rain and snow		0·95 in.

The Evaporation during this period was not ascertained; but it probably did not exceed half an inch.

Copenhagen, *December* 19.—The intense cold still continues, *in consequence of the east wind.* Reaumur's thermometer is 13 below Zero. From our custom house to the coast of Sweden, the Sound presents only one continued surface of ice. Should the frost continue a short time longer, it will soon be passable on foot. Some ships from our provinces, which are detained by the ice, have already sent home their crews.

Figure of a drowned Man in the Ice.

The curiosity of several persons in the neighbourhood of Halnaker, near Chichester, was last week excited by the figure of a man, apparently in a round frock, on the ice of a pond in the park; but no individual being missed in the parish, it was conceived to be an accidental impression on the ice, and was, by many, treated as a fancy. It being, however, last Tuesday, ascertained that a man named Richards, of the neighbouring parish of Charlton, was missing, the pond was searched, and he was found lying at its bottom, in 10 feet water, exactly under the figure. The ice was uniformly seven inches thick; but that which composed the figure was darker and more transparent.—(Pub. Ledger, *Dec.* 21).

Meteorological Observations

MADE AT

TOTTENHAM, NEAR LONDON,

IN THE YEARS

1813, 1814, 1815, 1816.

(First published Monthly in Thomson's Annals of Philosophy).

TABLE LXXVII.

	1812.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
12th Mo.	L. Q.	Dec. 25	N	30·46	30·40	35°	31°	—	—
		26	N	30·50	30·40	37	30	—	—
		27	N	30·52	30·48	36	29	—	1
		28	W	30·52	30·32	43	32	—	
		29	W	30·32	30·15	46	42	—	
		30	W	30·15	29·92	50	42	—	
1813.		31	W	29·81	29·75	44	40	—	—
1st Mo.	New M.	Jan. 1	W	30·09	29·81	45	38	—	—
		2	SW	30·26	30·09	44	36	6	—
		3	W	30·30	30·26	41	34	—	—
		4	SE	30·30	30·09	42	34	—	—
		5	SW	30·09	29·86	44	37	—	5
		6	SW	29·77	29·70	50	40	—	9
		7	NW	29·70	29·30	46	40	—	
	1st Q.	8	NW	29·62	29·30	48	28	—	
		9	NW	29·87	29·75	41	31	9	9
		10	NW	29·82	29·70	34	28	—	11
		11	SE	29·80	29·70	40	26	—	—
		12	SE	29·70	29·61	34	29	—	
		13	SE	29·58	29·53	38	34	5	16
		14	NE	29·74	29·53	38	33	—	
		15	NW	30·00	29·74	38	28	—	
	Full M.	16	E	30·20	30·00	44	29	—	
		17	SE	30·20	30·04	35	28	—	
		18	SE	30·14	30·04	31	30	—	
		19	E	30·26	30·14	33	31	—	—
		20	NE	30·27	30·26	34	30	—	
		21	NE	30·35	30·27	34	29	—	
		22	NW	30·50	30·35	36	23	15	
		23		30·38	30·22	35	30	—	8
				30·52	29·30	50	23	0·35	0·59

Notes.—Twelfth Mo. 25. A very slight fall of snow. 27. A little snow last night. 30, 31. Windy night: small rain at intervals.

1813. First Mo. 1. Small rain at intervals. 3. Misty morning. 5. Windy. 6. Windy: small rain. 7. Very misty a. m., dark and cloudy p. m. About eight some lightning, which was soon followed by a shower. 9. Hoar frost: at 9 a. m. thick air, with *Cirrostratus* and *Cirrocumulus:* sounds came freely from the city, with the wind at SSW. Sleet and rain followed within an hour. 13. Overcast a. m., thin sleet and rain. 14. Cloudy. 19. A little snow a. m. 22. Clear

NOTES, &c. *(continued).*

p.m. A fine red blush on the horizon at sunset. 23. Hoar frost: soon after noon a fine granular snow: after sunset a more plentiful spicular snow, adhereing to the trees and shrubs.

RESULTS.

Winds Variable.

Barometer:	Greatest height	30·52 in.
	Least	29·30 in.
	Mean of the period	30·022 in.
Thermometer:	Greatest height	50°
	Least	23°
	Mean of the period	36·25°
Evaporation		0·35 in.
Rain and snow		0·59 in.

STORM AT GIBRALTAR.

On the 29th December, a most violent storm came on at Gibraltar from the SE, in which many vessels and lives were lost.—The late gales at Gibraltar were more severe than any remembered to have been experienced. Twenty-eight vessels were lost in Catalonia Bay, and 20 in Gibraltar Bay. Many of the largest trees upon the rock were torn up by the roots, others entirely stripped of their limbs, *and some measuring upwards of* 18 *inches in diameter, broken short off in the trunk.*—(PUB. LEDGER).

TABLE LXXVIII.

	1813.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
1st Mo.	L. Q.	Jan. 24	NE	30·46	30·37	37°	24°	—	
		25	NE	30·47	30·45	36	29	—	
		26	NE	30·48	30·40	41	35	—	
		27	N	30·49	30·47	39	21	—	
		28	Var.	30·39	30·37	32	20	—	
		29	Var.	30·48	30·39	34	21	—	
		30	NW	30·48	30·44	42	30	—	
		31	NW	30·50	30·44	48	34	15	27
2d Mo.	New M.	Feb. 1	Var.	30·33	30·24	41	30	—	
		2	NW	30·37	30·32	41	36	—	
		3	NW	30·45	30·37	43	34	—	
		4	W	30·45	30·29	41	34	—	
		5	S	30·29	29·78	47	36	—	—
		6	SW	29·89	29·78	47	38	—	
		7	SW	29·98	29·79	48	37	—	—
	1st Q.	8	SW	29·66	29·63	52	44	—	—
		9	SW	29·88	29·66	51	35	—	36
		10	W	30·00	29·88	46	33	—	
		11	S	30·00	29·75	47	35	—	
		12	S	29·75	29·28	56	44	—	—
		13	SW	29·48	29·37	57	39	—	33
		14	SW	29·38	29·27	52	42	71	30
	Full M.	15	SW	29·34	29·27	52	41	—	18
		16	SW	29·44	29·34	48	41	—	—
		17	SW	29·37	29·30	52	43	—	27
		18	SW	29·88	29·37	52	41	—	—
		19	S	29·66	29·60	56	40	—	19
		20	SW	29·80	29·66	53	42	—	—
		21	SW	29·70	29·69	57	49	70	
				30·50	29·27	57	20	1·55	1·90

NOTES,—First Mo. 24. Light clouds and sunshine. 28. Rime on the trees: very misty a. m., clear p. m. 29. Hoar frost: the sky overcast. 30. Misty to the S a. m. A grey day. 31. Misty a. m. Heavy *Cirrostratus* clouds: rain at night.

Second Mo. 1. The *Cumulostratus*, which has not for a long time been exhibited, appeared to-day in large masses. 7. Showers and wind; at sunset, several large clouds of the modification *Nimbus*. 8. Stormy. 9. A violent thunder gust from the W about 2 p. m., by which considerable damage was done to the roofs and chimnies of houses, &c. This was followed by a series of heavy gales continuing

NOTES, &c. *(continued).*

(with a few short intervals of calm and pleasant weather) to the end of the period. The lunar halo appeared before several of these, of a large diameter; and, on the 18th, about 11 a.m. there was a brilliant rainbow. The River Lea has considerably inundated the adjacent lands.

RESULTS.

Winds in the fore part Northerly, with a very dry dense air, and low temperature: in the latter part Southerly, with a rare and moist atmosphere, and high temperature.

Barometer:	Greatest height	30·50 in.
	Least	29·27 in.
	Mean of the period	29·957 in.
Thermometer:	Greatest height	57°
	Least	20°
	Mean of the period	40·58°
Evaporation (at Stratford)		1·55 in.
Rain		1·90 in.

DEAL, *February* 16.—It last night blew excessively hard from the SSW, accompanied with a heavy sea.

February 18.—The wind the whole of last night and this day has blown tremendously from the west.

PORTSMOUTH, *February* 18.—The whole of last night and to-day it has blown very hard at SW, attended with very heavy squalls.—(PUB. LEDGER).

TABLE LXXIX.

	1819.	Wind.	Pressure.		Temp.		Evap.	Rain, &c.
			Max.	Min.	Max.	Min.		
2d Mo.	L. Q. Feb. 22	SW	29·80	29·69	57°	41°	—	
	23	NW	30·03	29·80	45	35	—	
	24	W	30·14	30·03	49	32	—	
	25	SW	30·13	29·83	50	36	—	71
	26	SW	29·90	29·70	52	35	60	8
	27	NW	30·33	29·90	46	32	—	
	28	NW	30·36	30·30	50	34	23	
3d Mo.	New M. March 1	SW	30·30	30·20	51	39	—	
	2	SW	30·20	30·02	47	35	—	—
	3	Var.	30·33	30·02	52	32	—	—
	4	SW	30·33	30·20	51	36	—	6
	5	W	30·34	30·20			—	
	6	W	30·40	30·34	53	35	—	
	7	NW	30·40	30·30	49	39	—	
	8	NW	30·30	30·20	54	48	—	
	1st Q 9	NW	30·20	29·89	52	36	56	—
	10	E	29·96	29·89	42	26	—	12
	11	NE	30·21	29·96	39	24	—	—
	12	NE	30·27	30·21	37	24	—	
	13	NW	30·27	30·20	40	29	—	
	14	SW	30·20	30·10	47	40	19	
	15	SW	30·18	30·10	53	43	—	
	16	Var.	30·18	30·09	51	32	—	
	Full M. 17	NE	30·09	29·96	56	32	—	
	18	NW	29·96	29·96	58	36	—	
	19	E	29·96	29·78	58	40	—	
	20	SW	29·96	29·78	56	35	—	14
	21	SW	29·96	29·84	53	42	31	
	22	SW	30·25	29·96	55	33	—	
	23	NW	30·30	30·28	50	34	—	
	24	W	30·28	29·98	47	39	18	35
			30·40	29·69	58	24	1·97	1·46

NOTES.—Second Mo. 24. Hoar frost. About 6 p. m. a very dark cloud came over, lowering with an arched base, as before thunder, and presently discharged a shower of large hail and rain, which was accompanied with a cold wind. 25. Fair a. m., wet and windy p. m., and night. 26. The same. 27. *Cirrus*, *Cumulus*, and *Cirrostratus* clouds appeared together: much wind: about 7 p. m. wind NW, a bright meteor passed from the zenith towards the N, declining a little westward. 28. Clear morning: wind moderate.

Third Mo. 1. Hoar frost, fair. 2, 3. Light showers. A *Nimbus* appeared S of the setting sun on the 3d, which went away southward. 9. Light showers. 10. Sleet a. m. At sunset a *Cumulostratus*, with a snowy appearance: some hail balls in the night. 11. A *Nimbus* was perceptible by 7 a. m., forming in the NE. There were some heavy (though transient) squalls of snow during the day. Abundance of snow fell on this and the following night to the southward, extending as far as the coast of France.

RESULTS.

Prevailing Winds Westerly, with a marked interruption by a current from the NE, occasioning snow about the middle of the period.

Barometer:	Greatest height	30·40 in.
	Least	29·69 in.
	Mean of the period	30·109 in.
Thermometer:	Greatest height	58°
	Least	24°
	Mean of the period	42·50°
Evaporation		1·97 in.
Rain		1·46 in.

EARTHQUAKE ON THE COAST OF DEVON.

March 21.—About six o'clock, the inhabitants of Exmouth were alarmed by the shock of an earthquake, which lasted for two or three seconds. The houses were shook, the people hurried from their beds, and the utmost alarm prevailed for some time throughout the town. The shock was felt in like manner at Sidmouth, Budleigh, Salterton, Starcross, and for many miles along the coast, but we have not heard of its having been attended by any ill consequences.—(PAPERS).

TABLE LXXX.

	1813.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
3d Mo.	L. Q.	March 25	NW	30·37	30·28	47°	35°	—	
		26	NW	30·50	30·37	51	27	—	
		27	SW	30·47	30·43	55	32	—	
		28	NW	30·43	30·30	67	49	—	
		29	SW	30·30	30·10	66	53	—	
		30	Var.	30·10	29·89	58	47	—	1
		31	SE	29·89	29·18	57	42	40	
4th Mo.	New M.	April 1	SW	29·25	29·18	50	35	—	27
		2	W	29·45	29·25	52	35	—	9
		3	SW	29·74	29·45	48	27	—	3
		4	SW	29·85	29·74	54	29	—	
		5	SW	29·85	29·81	51	40	—	13
		6	SW	29·90	29·74	58	45	—	
	1st Q.	7	W	29·93	29·90	65	43	43	—
		8	E	29·97	29·87	69	37	—	
		9	SE	30·04	29·97	66	41	—	
		10	E	30·10	30·04	65	41	26	
		11	E	30·14	30·10	64	35	—	
		12	E	30·23	30·14	69	42	—	
		13	NE	30·34	30·23	66	35	—	
		14	E	30·20	30·10	66	42	36	
	Full M.	15	NW	30·20	29·96	68	42	—	
		16	NW	29·96	29·77	66	44	—	
		17	NW	30·10	29·77	68	41	—	—
		18	NW	30·13	30·10	56	42	53	
		19	NW	30·10	30·10	64	44	—	
		20	NW	30·10	30·05	64	40	—	
		21	N	30·09	30·05	57	32	—	
		22	NE	30·10	30·08	50	32	—	17
		23	NE	30·14	30·10	45	34	40	
				30·50	29·18	69	27	2·38	0·70

NOTES.—Third Mo. 27. Hoar frost: large spreading *Cirri.* 28. Temperature 60° in the evening. 29. Overcast sky. 30. A veil of *Cirrostratus* a. m. The *Cumulus* afterwards shewed itself, and a slight shower ensued.

Fourth Mo. 1. Stormy, with rain. 2. Hoar frost: a sprinkling of opaque hail about sunrise. Several showers of this and some rain during the day. 3. Hoar frost: *Cumulus* a. m. Showers of snow, and of opaque hail p. m. 5. *Cirrostratus*, a. m. wet and windy. 10. *Cirrus* and *Cumulus* clouds: the wind increases in strength: the mornings have been misty of late, and there have been plentiful dews, in consequence of the great difference between the temperature of day and night. 15. Wind boisterous in the evening. 16. Cloudy a. m. 17. Slight showers. 20. From the 7th of this month we have had summer like days and cold nights: the roads have become very dusty, and the earth considerably dry. 21. Some clouds of a threatening appearance from the NE in the evening, attended with depression of temperature. 22. p. m. Hasty showers, mixed with hail; after which steady small rain till evening. 23. Cloudy: several scanty hail showers from large *Nimbus* clouds passing over. During the approach of one of these, a slender, tapering, and somewhat twisted column, appeared in front, detached from the main body, and reaching down to the earth in the manner of a water spout. In a few minutes, by spreading on all sides, it became incorporated with the rest of the shower. This is not a very uncommon appearance, but I have seldom seen it so perfectly exhibited.

RESULTS.

Prevailing Winds Westerly, interrupted (after the middle of the period) by an Easterly current.

Barometer:	Greatest height	30·50 in.
	Least	29·18 in.
	Mean of the period	30·005 in.
Thermometer:	Greatest height	69°
	Least	27°
	Mean of the period	49·11°
Evaporation		2·38 in.
Rain		0·70 in.

LARGE METEOR.

On Friday evening the 23d of April, between nine and ten o'clock, a fiery meteor was seen at Brigg, (Lincolnshire,) in a northerly direction. When first discovered, it was at a considerable height, and gliding downwards in an oblique manner. It appeared about the size of a full moon, of the colour of burning brimstone, and constantly emitting small balls of very brilliant red light, which took an opposite direction, and soon disappeared; and by which the meteor appeared completely exhausted before it reached the ground. (PUB. LEDGER).

TABLE LXXXI.

	1813.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
4th Mo.	L. Q.	April 24	NE	30·14	29·95	—°	35°	—	
		25	NE	29·95	29·71	53	43	—	51
		26	SE	29·71	29·51	—	39	—	
		27	NW	29·51	29·36	48	45	—	52
		28	N	29·61	29·36	50	41	15	4
		29	NE	29·65	29·61	49	39	—	21
	New M.	30	E	29·65	29·63	—	—	—	—
5th Mo.		May 1	NE	29·72	29·63	59	45	—	25
		2	Var.	29·79	29·72	61	46	—	
		3	E	29·79	29·73	66	50	17	17
		4	Var.	29·86	29·73	65	51	—	24
		5	NW	29·91	29·87	64	49	—	—
		6	NE	29·87	29·69	68	50	—	16
	1st Q.	7	SE	29·70	29·69	69	45	—	8
		8	SE	29·70	29·57	68	49	27	—
		9	N	29·73	29·57	72	52	—	—
		10	Var.	29·90	29·73	69	47	—	8
		11	Var.	29·73	29·60	67	53	—	5
		12	SW	29·64	29·60	74	49	—	3
		13	SW	29·64	29·46	72	51	35	—
		14	Var.	29·47	29·39	68	52	—	9
	Full M.	15	SW	29·70	29·57	65	47	—	—
		16	SW	29·72	29·41	65	49	—	51
		17	NW	29·82	29·68	60	47	—	—
		18	Var.	29·80	29·78	60	49	45	25
		19	SW	29·84	29·56	69	50	—	—
		20	W	29·59	29·57	61	42	—	—
		21	W	29·64	29·59	59	39	—	—
		22	W	22·69	29·59	58	30	28	53
				30·14	29·36	74	30	1·67	3·72

Notes.—Fourth Mo. 24. Heavy *Cumulostratus* clouds through the day. 25. Rain nearly the whole day. 26. The *maximum* of temperature at 9 a. m., cloudy: clear at evening, with *Cirri*. 27. A wet day. 28. Wet morning: cloudy. 29, 30. Cloudy: much wind.

Fifth Mo. 1. The *maximum* of temperature at 9 a. m., wet. 2. Cloudy a. m. In the afternoon the sky cleared pretty suddenly, save that some dense *Cumulus* clouds remained in the NE, to the summit of one of which a *Cirrostratus* was observed for a considerable time adhering, which was at length incorporated with the larger cloud. The moon appeared with a pale golden crescent, the remainder of the disk being pretty conspicuous. 3. Dense *Cumulus* clouds to the S, with *Cirrus* and *Cirrocumulus* intermixed (as before thunder). A shower of large drops about sunset. 4. Overcast sky a.m. About 6 p.m. (after some previous dripping) a thunder storm, the weight of which fell to the E of us. A most brilliant rainbow, together with a complementary one, was exhibited for about forty minutes. The space included *within* the proper bow was very perceptibly *lighter*, and that *without* it, extending to the complementary arch, as much *darker* than the rest of the cloud. A nightingale sang with spirit in the midst of the shower. 6. a.m. Much dew: p.m. a large *Nimbus* in the N. *Cirrostratus* in the E, and *Cirrus* above, stretching from E to W. The large cloud moved away by W into the S. A thunder storm ensued in that direction, though nearly out of hearing, and lasted till midnight; after which we had a sudden heavy shower. 7. a.m. Cloudy: p.m. (after a shower) clearer, but with indications of more rain. 8. An appearance of much electrical action in the clouds far to the S and SW. 9. A few drops of rain a.m., various modifications of cloud appeared this day. 10. *Nimbi:* dripping afternoon: rainbow: fine evening. 13. Cloudy, windy. 14. Much wind. 15. The same: calm night. 16—18. Much wind: showers.

RESULTS.

Winds Variable.

Barometer:	Greatest height	30·14 in.
	Least	29·36 in.
	Mean of the period	29·678 in.
Thermometer:	Greatest height	74°
	Least	30°
	Mean of the period	54·79°
Evaporation (the gauge being now placed on the ground)		1·67 in.
Rain		3·72 in.

A gauge placed against the north wall of the house, at about seven feet elevation, gave, for the evaporation in the same time, only 1·16 in.

THUNDER STORMS.

On the afternoon of Friday the 14th May, there was a dreadful storm of thunder and lightning, about thirty miles north of Aberdeen.

May 17.—The town of Macclesfield was visited by one of the most awful storms of hail, accompanied by loud thunder and lightning, remembered by any of its oldest inhabitants—the lower part of the town was inundated.—(PUB. LEDGER).

TABLE LXXXII.

	1813.		Wind.	Pressure.		Temp.		Evap.	Rain &c.
				Max.	Min.	Max.	Min.		
5th Mo.	L. Q.	May 23	W	29·59	29·55	59°	49°	—	
		24	NW	29·70	29·55	60	49	—	
		25	NW	29·76	29·65	61	49	—	
		26	W	30·05	29·76	57	41	—	
		27	NW	30·10	30·05	60	42	—	
	New M.	28	Var.	30·10	29·96	72	42	—	
		29	NE	30·06	29·96	76	53	—	
		30	S	29·97	29·90	73	56	65	34
		31	NW	30·00	29·97	78	59	—	2
6th Mo.		June 1	E	29·97	29·83	85	50	—	
		2	NE	29·95	29·83	84	54	—	
		3	NW	30·17	29·95	72	51	—	
		4	NW	30·17	29·88	65	51	75	
	1st Q.	5	NW	29·88	29·82	58	48	—	
		6	NE	29·73	29·67	56	47	—	
		7	NE	29·80	29·73	71	43	—	
		8	NE	29·73	29·51	75	48	—	
		9	NW	29·53	29·43	75	54	48	—
		10	NW	29·83	29·53	75	48	—	
		11	S	29·83	29·74	76	52	—	
		12	SE	29·98	29·74	77	45	—	
		13	W	30·02	29·97	75	51	48	5
	Full M.	14	SW	30·07	29·78	67	52	—	—
		15	SW	29·98	29·78	67	46	—	—
		16	NW	30·04	29·98	63	44	—	—
		17	Var.	30·09	30·04	61	48	—	—
		18	N	30·15	30·09	61	39	—	—
		19	N	30·16	30·15	57	37	—	—
		20	NE	30·20	30·16	60	42	42	65
				30·20	29·43	85	37	2·78	1·06

NOTES.—Fifth Mo. 30. A shower p. m.: thunder to the westward. 31. Fine day: some thunder clouds appeared; the evening twilight was brilliant and tinged with orange—the new moon was conspicuous, and there fell much dew.

Sixth Mo. 1. *Cumulus*, *Cumulostratus*, and *Cirrostratus* clouds. The sunset was cloudy, with an orange tint. 2. *Cirrostratus* clouds, with haze to the S at sunset. At the same time there were *Cirri* in the N more elevated, and finely tinged with red. 4. Windy: cloudy till evening. 5. Clear a. m., afterwards cloudy and windy. 8. Windy: at sunset *Cumuli*, with the *Cirrostratus* attached: much orange in the twilight. 9. A shower early: cloudy, dripping. 10. p.m. Large elevated *Cirri*. 11. a.m. *Cumulostratus* clouds: p.m. *Cirri* in abundance lowering and thickening. 12. *Cirri*, tinged red in the morning early: before eight it was overcast, and rain fell. 13. a.m. Cloudy: a shower at evening. 14—20. Occasional showers, some of which were heavy.

RESULTS.

Prevailing Winds Northerly.

Barometer:	Greatest height	30·20 in.
	Least	29·43 in.
	Mean of the period	29·889 in.
Thermometer:	Greatest height	85°
	Least	37°
	Mean of the period	57·93°
Evaporation		2·78 in.
Rain		1·06 in.

Light of the Moon compared with the Evening Twilight.

Seventh Mo. 12, 1813.—A clear evening, with a gentle breeze from the west. The twilight being very brilliant and the Moon near the Full, I compared the intensity of their respective and opposite shadows, projected by a slender rod on white paper. At 9 p.m. the shadow of the twilight was very perceptible in the moonlight: but at 9 h. 20 min. the Moon cast an equally strong shadow into the twilight, which shadow appeared (as in the well-known experiment of the shadow of a candle in the daylight) of a bluish grey colour.

Thus it appears, that in certain conditions of the atmosphere favourable to refraction, the Sun affords us as much light an hour after he has set, as the Full Moon does an hour after she has risen.

TABLE LXXXIII.

	1813.		Wind.	Pressure. Max.	Min.	Temp. Max.	Min	Evap.	Rain, &c.
6th Mo.	L. Q.	June 21	NE	30·16	30·14	66°	46°	—	
		22	NE	30·18	30·14	67	41	—	
		23	NE	30·10	30·08	70	55	—	
		24	NE	30·15	30·08	64	46	—	—
		25	E	30·18	30·15	74	50	55	4
		26	NE	30·18	30·10	74	48	—	
		27	E	30·10	29·97	77	45	—	
	New M.	28	Var.	29·97	29·77	75	53	—	37
		29	SW	29·77	29·64	74	52	—	80
		30	W	29·64	29·54	65	52	40	75
7th Mo.		July 1	NW	29·75	29·64	70	53	—	16
		2	N	29·86	29·75	67	50	—	20
		3	NW	30·11	29·86	73	42	25	
		4	NW	30·18	30·11	70	50	—	2
		5	W	30·18	30·04	74	47	—	
	1st Q.	6	SW	30·04	29·74	78	56	35	
		7	S	29·65	29·57	78	57	—	
		8	W	29·59	29·55	75	55	—	—
		9	W	29·83	29·59	79	54	36	
		10	NW	29·91	29·83	78	51	—	
		11	NW	29·93	29·90	77	51	—	
		12	W	29·90	29·76	76	51	—	
	Full M.	13	SW	29·76	29·63	76	58	38	
		14	SW	29·63	29·60	71	58	—	
		15	NW	29·70	29·60	67	50	—	60
		16	NW	29·82	29·70	73	50	—	10
		17	NW	28·87	29·82	74	47	—	—
		18	W	29·87	29·73	73	50	43	
		19	W	29·73	——	73	—	—	—
				30·18	29·54	79	41	2·72	3·04

Notes.—Sixth Mo. 21. Brisk wind through the day. 22. Wind more gentle: *Cumulostratus* and *Cirrostratus*. 24. A shower about 1 p. m. 25. The wind inclines to SE: clear twilight, somewhat orange coloured. 27. *Cirrus*, changing to *Cirrocumulus* and *Cirrostratus*: twilight somewhat opaque, but coloured. 28. Wind NE a. m.: the *Stratus* cloud appears to have prevailed in the night: slight showers at intervals during the day: at 7 p. m. several *Nimbi*, and some thunder to the SW, which with occasional lightning passed by S to NE: at 9 p. m. the air was so loaded with vapour as to deposit water on a glass vessel cooled only to 58·5°: it now began to rain heavily, ceasing at ten, with thunder and lightning still in the N. 29. *Cirrus, Cirrostratus,* and *Cumulostratus:* about 1 p. m. a heavy storm of rain and hail, with several electrical discharges. 30. In the forenoon heavy rain, ushered in by a peculiar hollow sound in the wind, then southerly: wet at intervals, p. m.: a part of this day's rain was taken by estimation, the gauge having been left under cover.

Seventh Mo. 3. After an appearance of two distinct orders of cloud during the forenoon, inosculation took place suddenly about one, and the *Cumulostratus,* with a brisk wind, prevailed till sunset. 4. A slight shower p. m.: from the 5th to the 9th several kinds of cloud prevailed, and occasioned at times considerable indications of rain, of which however a few drops only fell, the clouds still passing away to the N: in that quarter, on the evening of the 9th we had several distant *Nimbi,* with the usual appearances of a strong electric charge: a single flash of lightning, and some rain just discernible in the horizon, were the only results. 13. After repeated exhibitions of the *Cumulostratus,* which continued to pass over to the N, we had this night a few drops of rain. 14. Dripping at intervals: the dust laid. 15. A wet day. The vulgar notion, that rain on this day (by the church calendar given to St. Swithin) is followed by the same *daily for forty days,* if tried *at any one station* in this part of the island, will be found fallacious. 16. Thunder p. m. during a shower. 17. A slight shower p. m., dew on the grass. 18. A fine day: the *Cumulostratus* prevailed, and the evening was very clear, with dew. 19. Showers.

RESULTS.

Prevailing Winds Easterly to the New Moon, afterwards Westerly.

Barometer:	Greatest height	30·18 in.
	Least	29·54 in.
	Mean of the period	29·875 in.
Thermometer:	Greatest height	79°
	Least	41°
	Mean of the period	61·69°
Evaporation		2·72 in.
Rain		3·04 in.

Shadows of Clouds projected in a Hazy Atmosphere.

Seventh Mo. 16, 1813.—After pretty much wet yesterday, we had this day *Cumulus* and *Cumulostratus,* passing to *Nimbus,* with a thunder shower about 4 p. m. The sun then passed behind a group of dense clouds in the NW, darting those broad diverging beams of light separated by shadows, first downwards on the horizon and then up into the air, which Virgil so correctly defines in his first *Georgic:*—

> Aut ubi sub lucem densa inter nubila sese
> Diversi erumpent radii.—

It is obvious that these beams, should they be at any time extensive enough to pass the zenith of the observer, ought to converge again towards a point on the eastern horizon opposite to the sun's place in the western: which was in fact partially the case this evening.

Seventh Mo. 22. Travelling this evening between Winchester and Alton, with the setting sun behind me, I observed a considerable accumulation of dewy haze above the horizon before me, slightly reddened by the sun's rays; and in the midst of it several broad bars of shadow, *converging to a point on the horizon*, (conformably to the observation I made on the 16th inst.) and projected apparently by separate lofty dense clouds then remaining to the westward.

From long experience I am accustomed to connect the appearance of this elevated haze amidst clouds in warm weather with a thunder storm falling on the tract beneath it: and the reader will perceive, from the Notes, that this connexion probably existed in the present, as in the former instance.

Phenomena of the Evening Twilight.

Seventh Mo. 29, 1813.—This was a peculiarly fine evening for observing the phenomena of the twilight. The sun set, surrounded by a moderate glow of flame colour, and without a speck on the western sky. An extensive brightness was left along the horizon, which insensibly vanished upwards, and towards the NE and SW. Opposite to this, and quite distinct in its boundaries, appeared in the SE the reflection from the *dewy haze* (dew now falling in abundance) which resting on the horizon by an extensive violet or purplish base, rose diminishing, till it terminated in a rose-coloured apex. As this went off, an orange tint in the NW spread and deepened, and was suddenly surmounted by a fine blush of red, making out the remainder of a grand pyramid of coloured light, reaching half way to the zenith, and glowing every moment with increasing brightness: so that at half an hour after sunset, the landscape to the eastward was actually in a much stronger light than immediately after the disappearance of that luminary. By the time that this was in perfection, the opposite pyramid was no longer visible: and, the twilight beginning to go off, the *red* first vanished, the orange rather spreading upward, at the same time that together with the white light, or ground of the picture, it grew every minute fainter: it was not however wholly extinct at half-past ten, or two hours from the commencement at sunset.

Singular Meteor.

The same night at ten, after several small meteors (or shooting stars) a more considerable white one passed the zenith from SE to NW, in a kind of spiral or twisted line, wasting away as it went, leaving a long train of whitish sparks; and, unless my sense was deceived by a strong association of ideas, *hissing* like a rocket in its course. The impression it left on my mind was altogether that of a solid ignited projectile.

Summer Lightning.

It is a popular error, very commonly entertained, that on fine summer evenings there is sometimes a harmless kind of lightning, without the usual accompaniments of dense clouds and electrical explosions. The mistake has originated in the great distance at which lightning may be perceived in a dark night.

Seventh Mo. 31. I perceived much faint lightning in the SE, although it was bright starlight, and not a cloud visible at the time. On communication with my brother, who was then at Hastings, he informed me, that they had on the above mentioned evening a heavy thunder storm in view for some hours, ranging, as he conceived, *in a line between Dunkirk and Calais on the opposite coast.* It is probable therefore that the greater part of the discharges, the faint light of which was perceptible at Tottenham, were actually made at the distance of 120 miles. I saw however one stroke with the usual linear zig-zag appearance, which I judged to proceed from the earth to the clouds, and which may have been *a returning stroke* far on this side of the storm.

THUNDER STORMS.

During a violent thunder storm, at Rolleston, Staffordshire, *ten head of deer* belonging to Sir Oswald Moseley, were killed by the lightning.

The neighbourhood of *Diss,* Norfolk, was visited by a short but severe storm of thunder and lightning, about two o'clock on the 16th of July.—(PUB. LEDGER).

TABLE LXXXIV.

	1813.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
7th Mo.	L. Q.	July 20	E	29·51	29·49	75°	56°	—	
		21	NW	29·55	29·51	68	57	—	
		22	SW	29·55	29·50	75	58	—	
		23	SW	29·50	29·42	75	53	—	1·09
		24	W	29·53	29·40	74	55	48	77
		25	SW	29·54	29·40	73	53	—	4
		26	W	29·78	29·54	69	53	—	32
	New M.	27	W	30·07	29·78	75	51	32	10
		28	W	30·17	30·07	77	50	—	
		29	E	30·07	29·95	78	54	—	
		30	S	29·91	29·80	82	60	56	
		31	NW	29·95	29·91	78	53	—	
8th Mo.		Aug. 1	SW	29·96	29·93	78	59	—	5
		2	W	29·93	29·81	79	56	—	
		3	SW	29·78	29·72	76	51	38	—
	1st Q.	4	NW	29·75	29·55	73	49	—	—
		5	S	29·53	29·42	71	49	—	26
		6	NW	29·85	29·53	78	54	—	1
		7	W	29·92	29·91	74	49	—	
		8	SW	29·89	29·87	75	53	50	6
		9	NW	30·10	29·89	70	49	—	—
		10	Var.	30·10	30·07	76	57	—	—
		11	SE	30·07	29·98	79	51	30	
	Full M.	12	SW	29·96	29·89	80	54	—	
		13	NW	30·08	29·95	72	48	—	—
		14	NW	30·08	29·83	72	57	42	—
		15	NW	29·83	29·78	76	51	—	
		16	NW	29·82	29·80	70	50	—	
		17	W	29·82	29·78	76	52	—	
		18	NW	30·05	29·82	75	47	46	
				30·17	29·40	82	47	3·42	2·61

NOTES.—Seventh Mo. 23. Continued heavy rain for above two hours p. m. with distant thunder. (This was about Bromley, in Kent, where a house was struck with lightning.) 24. A heavy thunder shower about 3 p. m.: rainbow. 25. Windy, cloudy, rainbow: broad diverging shadows on a coloured twilight, with *Cirrostratus* and haze to the S. 26. Fair a. m.: at noon began a steady rain with distant thunder: in the evening, several distinct *Nimbi*, in particular a well formed one in the NE. 27. *Cumulostratus* a. m.: rain p. m., with distant thunder: evening distant *Nimbi*, and a rainbow: much colour, with broad shadows in the twilight. 28. Much dew: *Cumulus*, with

Cirrus: at sunset a calm air, with large plumose *Cirri*, highly coloured. 29. A clear day, the wind passed from S to E: twilight brilliant, with dew: the New Moon shewed a well defined disc at 8h. 30m. p. m. 30. *Cumulus*, with *Cirrus* passing to the inferior modifications: in the evening, on the S horizon, *Cumulus*, mixed with *Cirrostratus* and haze, the twilight of a pink colour: it lightened frequently before ten at night very far in the SE, with the wind S.

Eighth Mo. 1. Rain at 5 a. m. succeeded by a close canopy of *Cumulostratus:* at sunset, *Cirrus* with *Cirrocumulus:* twilight opake, somewhat orange coloured. 2. Much the same phenomena as yesterday. 3. Some drizzling showers, with wind a. m.: sunset very dark, the sky being full of broken *Cumuli:* night windy. 4. Windy a. m., with *Cumulus*, which, p. m. inosculated with *Cirrostratus* above it. 5. Rain early, the wind S: in the evening (after several showers) clouds in various modifications, the wind W, with lightning to the S. 6. Much wind at NW, with *Cumulus:* a shower p. m. 8. Close *Cumulostratus* most of the day: rain, evening. 9. Wind brisk at NNW, a. m.: at noon, the upper clouds were perceived not to move with this wind, and at evening it fell calm: there were now in the sky rose coloured *Cirri* in stripes, from SE to NW, with *Cirrostratus* and *Cumulostratus* in a lower region: twilight orange, surmounted with rose colour. 11. A *Stratus* after sunset, with *Cirrostratus* remaining above: small scintillant meteors now appeared, falling almost directly down, and seeming to originate very low in the atmosphere. 13. *Cirrus* and *Cirrocumulus* abounded: there was a slight shower about noon. 14. Overcast, a little rain after sunset. 16. The maximum of the temperature for 24 hours past occurred at 9 a. m. 17. Overcast: windy.

RESULTS.

Prevailing Winds Westerly.

Barometer:	Greatest height	30·17 in.
	Least	29·40 in.
	Mean of the period	29·799 in.
Thermometer:	Greatest height	82°
	Least	47°
	Mean of the period	63·88°
Evaporation		3·42 in.
Rain		2·61 in.

THUNDER STORMS.

July 23.—Between one and two, the city of *Glasgow* was visited by a heavy shower of rain, accompanied by tremendous peals of thunder.

Between three and four o'clock of the afternoon of July 24, *Scarborough* was visited with most tremendous thunder and lightning.—(PUB. LEDGER).

NOTES, &c. *(continued)*.

[DESCRIPTION OF A HURRICANE, FROM A BERMUDA PAPER.]

"*Nassau, (Bahama,) August* 1, 1813.

"The dawning of Monday the 26th ult. exhibited a serenity, calculated to lull to sleep the fears of the most wary; and the breeze freshening on the sky, it was hailed by all as a happy relief from the extreme sultry heat of the atmosphere.—

"At ten o'clock the wind increased, and continued increasing, accompanied by short showers of rain. It gained considerably in the course of an hour; at 11 it blew a strong gale, and some of the shipping in the harbour appeared uneasy at their anchorage; but it was not until 12 o'clock that it attained the height which constitutes the commencement of an hurricane, and which soon became evident by its destructive effects upon the waters, and upon the shore. Some of the vessels in the harbour were driven from their moorings, and houses began to totter upon their foundations. At about half-past two o'clock the hurricane attained its greatest height, and its *acme* continued, without interval, until five, when it suddenly ceased; and *in the space of half an hour succeeded a calm*, so perfect, that it can be compared only to that of death after the most dreadful convulsions.

"The Government-house, the greater part of the other public buildings, a great number of other houses, the wharfs, the orchards, and gardens were found either wholly or partly destroyed; and all the vessels in the harbour (two excepted) were driven on shore or sunk.

"The inhabitants of the colony, well knowing the nature of hurricanes, took every precautionary measure within their reach during the calm or lull, *to prepare for its second part, expected from the SW*, and which set in with great fury at about six o'clock, and continued until midnight, when it considerably abated, and soon after totally ceased. The SW storm differed from the north-eastern one, by appearing *in heavy blasts of a few minutes' duration*, repeated after lulls of equal length, until it so ceased: whereas the first storm *raged without intermission*. This last, however, nearly completed the general ruin, and it is believed that if it had raged another hour, scarcely a house would have remained standing in this city; which, before the storm, was considered, in proportion to its size and population, to be one of the most wealthy and most flourishing in the world."

Hurricanes appear to have been felt about this time, through the whole extent of atmosphere between the two great divisions of the American continent. I have selected this from a number of reports in the papers, for the purpose of attempting to explain some peculiar and characteristic facts contained in the narrative.

The present storm seems to have consisted chiefly in a prodigious aggravation (for the time) of the velocity and force of the currents, which ordinarily proceed to, and return from the great equatorial stream. After an obstruction for some considerable time of this interchange of air, causing oppressive heat at the Bahamas, rarefaction suddenly ensues to the SW of these islands; a portion of the tropical air is rapidly elevated, and the air which supplies it place from the NE, from some cause not as yet apparent, flows in a *confined and accelerated* stream. That this stream, however, originates in the same cause with the ordinary trade wind, and is destined to supply the void caused by rarefaction to leeward, is evident, for it commences with the rising sun, assumes its greatest force at the time when the heat of the day is established, and ceases in the evening. This part of the hurricane blows with steady unintermitting violence, in which respect it agrees with our own north-easterly gales. When it is spent, *a stratum of air*, which had been interposed between it and the returning tropical current, suddenly shews itself; and, having been balanced between these opposite impulses, obeys neither, but appears (as it is) at rest as to horizontal movement. But this calm is of short duration: the superior SW wind comes down, and the moment it touches the earth, the storm is re-established. A difference however is now observable in the movement: for this inundation from the south, being urged by an unsteady force from behind, comes on in successive billows, like the tide making on the shore; and in this respect agrees precisely with our own southerly storms. At length, this current having spent on the earth the momentum it had acquired from the circumstances of the preceding day, it also ceases; and things return to their ordinary state, until the next occasion of obstructed, and subsequently accelerated, movement in the currents.

TABLE LXXXV.

		1818.	Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
8th Mo.	L. Q.	Aug. 19	N	30·14	30·05	71°	47°	—	
		20	N	30·14	30·11	70	40	—	
		21	NW	30·11	29·83	68	50	26	—
		22	NW	29·91	29·71	65	44	—	17
		23		30·23	29·91	67	46	—	
		24	NE	30·25	30·23	69	42	24	
		25	NE	30·25	30·23	70	52	—	
	New M.	26	NE	30·23	30·15	69	48	—	
		27	NW	30·15	30·10	68	51	25	—
		28	N	30·10	30·06	66	53	—	15
		29	NE	30·22	30·10	69	52	—	4
		30	NE	30·26	30·26	67	53	—	
		31	E	30·26	30·05	70	53	32	
9th Mo.		Sept. 1	SE	30·05	29·85	65	56	—	—
	1st Q.	2	SW	29·90	29·85	67	48	—	—
		3	S	29·95	29·85	75	58	—	
		4	S	29·85	29·75	73	60	—	—
		5	SW	29·75	29·25	70	56	—	69
		6	SW	29·49	292·7	68	52	61	—
		7	W	29·67	29·49	64	44	—	—
		8	NW	29·85	29·67	56	43	—	—
		9	NW	30·19	29·85	50	41	—	
	Full M.	10	NW	30·24	30·19	61	49	—	
		11	SW	30·24	30·10	70	58	55	
		12	SW	30·06	30·00	72	51	—	
		13	NW	30·06	30·05	63	51	—	18
		14	NW	30·18	30·06	64	42	—	
		15	SW	30·18	30·17	70	51	—	
		16	NW	30·29	30·17	72	50	40	
				30·29	29·25	75	40	2·63	1·23

Notes.—Eighth Mo. 19. *Cirrus* and *Cirrostratus* clouds: rather windy. 20. *Cumulostratus:* windy: *Cirrus* clouds, very red at sunset. 21. Windy. 22. Cloudy morning, small rain: showers and wind: rainbow about 6 p.m., the sky richly coloured, and the clouds evaporating. 24. *Cumulus* during the day: *Cirrus* at sunset: twilight brilliant and coloured, with traces of *Cirrocumulus* and of *Stratus*. 25. Overcast with *Cumulostratus:* twilight opake and coloured. 26. Windy a. m.: *Cumulostratus* clouds, the remains of which at sunset, glowed with a succession of crimson and purple tints on a full orange ground. 27. Windy a.m., a little rain. 28. Overcast: much wind, and at night rain. 29. *Cumulostratus* clouds chiefly: a shower or two: the twilight luminous, but opake and surmounted by a blush of red considerably elevated. 30. Cloudy a. m.

Ninth Mo. 1. Slight shower at evening. 2. Very cloudy morning. 5. Heavy rain after 6 p. m., lunar halo. 6. Rainy morning: high wind. 7. Much wind still: showery. 9. Very fine moonlight night. 12. Abundance of *Cirrocumulus*, gradually lowering, and arranged in close lines from SE to NW. 14. A shower in the evening. 16. About 5 p. m. a solar halo of short continuance: the sky at sunset was (as usual of late) much coloured: there was considerable diffused redness above the twilight, and some portions of the clouds seen against this, varied from the usual indigo colour to a pale olive green: an indistinct appearance of *Nimbus* in the E horizon.

RESULTS.

Prevailing Winds Northerly, with an interruption of some days continuance from the Southward, producing for the time a considerable depression of the barometer, together with elevation of the mean temperature, and rain.

Barometer:	Greatest height	30·29 in.
	Least	29·25 in.
	Mean of the period	30·009 in.
Thermometer:	Greatest height	75°
	Least	40°
	Mean of the period	58·44°
Evaporation		2·63 in.
Rain		1·23 in.

TABLE LXXXVI.

	1813.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
9th Mo.	L. Q.	Sept. 17	SE	30·22	30·11	72°	56°	—	
		18	SE	30·11	30·01	70	46	—	
		19	E	30·01	29·92	72	43	—	
		20	NE	29·90	29·89	66	45	—	
		21	NE	29·91	29·87	70	50	29	—
		22	N	29·96	29·90	68	48	—	6
		23	NE	30·01	29·96	64	54	—	14
	New M.	24	NE	30·11	30·01	66	47	—	—
		25	NE	30·11	30·03	62	51	20	
		26	NE	30·03	30·01	67	47	—	
		27	E	30·01	29·94	66	44	—	
		28	NE	———	29·94	60	47	—	—
		29	NE	30·12	———	62	47	21	
		30	NE	30·12	29·84	62	40	—	
10th Mo.		Oct. 1	NE	29·84	29·68	61	41	—	
	1st Q.	2	NE	29·70	29·67	59	49	—	—
		3	SE	29·80	29·70	62	48	21	—
		4	SE	———	———	62	52	—	—
		5	W	29·78	29·65	66	54	—	
		6	SW	29·80	29·77	66	52	—	
		7	SW	29·52	29·47	65	51	—	—
		8	W	29·73	29·46	60	54	—	2·50
		9	Var.	29·43	29·42	61	49	—	
	Full M.	10	SW	29·44	29·15	65	45	—	4
		11	W	29·46	28·93	60	48	—	—
		12	SW	29·75	29·55	60	41	—	—
		13	SW	29·55	29·34	58	52	—	45
		14	NW	29·62	29·52	58	34	—	29
		15	S	29·58	29·21	51	33	28	47
				30·22	28·93	72	33	1·19	3·95

Notes.—Ninth Mo. 19, 20: Breezes by day: much dew by night. 21. Cloudy quite to sunset: a few drops of rain. 22. A breeze a. m.: some clouds followed by a sudden shower p. m.: rain in the night. 23. Windy: showers. 24. Much wind. 25. Windy: cloudy. 26. Overcast a. m., clear p. m.: luminous twilight, with *Cirrus* and *Cirrocumulus*. 27. Morning twilight somewhat coloured but less luminous: forenoon overcast: p. m. clear: at sunset fascicular *Cirri*, arranged from W to E, the wind E, nearly calm: after these appearances, lightning far to the S, E, and SW. 28. Cloudy, with a few drops.

30. A pink twilight, with dense coloured Cirri. For three days past, a steady NE breeze, with pretty much sunshine.

Tenth Mo. 1. Overcast a.m., wind N: after sunset *Cirrocumulus* passing to *Cirrostratus*, a corona about the Moon, and a small meteor passing westward. 2. Overcast most of the day: a few drops p.m. 3. *Cirrus* with *Cumulostratus:* twilight opaque and orange coloured: the roads have of late become excessively dry, and the dust raised from them floats in great quantity in the air. 4. Early this morning began a steady rain which continued till after sunset. 5. Fine day: lunar halo at night. 6. Cloudy. 7. A considerable storm of thunder and lightning early this morning, followed by much rain. 8. Fair a.m., wet p.m. 9. Fine. 10. Wet with a fair interval about noon. 11. Wet a.m., fair p.m. 12. Fine a.m., showery p.m. 14. Fair. 15. Rainy.

RESULTS.

Prevailing Winds Easterly, and drying to the Moon's first quarter: after which they became Westerly, and brought much rain.

Barometer:	Greatest height	30·22 in.
	Least	28·93 in.
	Mean of the period	29·752 in.
Thermometer:	Greatest height	72°
	Least	33°
	Mean of the period	55·28°
Evaporation		1·19 in.
Rain		3·95 in.

The rain of the 4th of tenth month having put a period to a fair season of some weeks continuance, I availed myself of a journey I made immediately after it, to endeavour to ascertain by inquiry how far it had extended. I found it had rained on that day from morning to night through the whole distance from London to York; as likewise further north, quite to the Tyne, and across the island from Cheshire to Northumberland. It having been likewise a very wet day on the south coast, the conclusion seems to be that the whole of England, at least, was on this occasion irrigated at once, by the introduction of a current from the Atlantic, which now *displaced* completely the easterly breeze previously deflected from the NE to the SE; both currents on this occasion probably depositing the excess of water with which they were charged.

WEATHER AT GIBRALTAR.

Gibraltar, '*October* 5.—This has been the coolest summer ever remembered, the rains have fallen early; and the weather now is not warmer than in England in the autumn.—The mornings, for these some days have been cold enough to render a fire agreeable, with a *NW* wind, and the most delightful, pure, and serene sky that can possibly be imagined.'

TABLE LXXXVII.

	1813.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
10th Mo.	L. Q.	Oct. 16	W	29·20	28·74	51°	38°	—	19
		17	SW	29·01	28·64	52	42	—	8
		18	NW	29·55	29·44	58	35	—	
		19	Var.	29·66	29·55	50	27	—	
		20	E	29·66	29·50	52	42	12	14
		21	Var.	29·76	29·50	54	43	—	—
		22	NE	29·89	29·45	53	40	—	10
		23	E	29·91	29·86	52	51	12	
	New M.	24	NE	29·86	29·82	57	45	—	
		25	NE	30·12	29·82	53	37	—	—
		26	NE	30·12	29·85	47	36	—	
		27	NE	29·79	29·77	41	34	17	6
		28	N	29·90	29·79	46	33	—	
		29	E	29·90	29·70	47	27	—	—
		30	Var.	29·70	29·00	52	30	—	50
		31	W	29·25	29·00	56	30	—	—
11th Mo.	1st Q.	Nov. 1	W	29·68	29·25	49	31	—	—
		2	NW	29·83	29·41	49	35	8	9
		3	SW	30·32	29·83	51	29	—	—
		4	W	30·34	30·32	45	27	—	
		5	S	30·32	29·95	47	29	—	
		6	E	29·95	29·70	45	35	14	6
		7	SW	29·70	29·37	53	41	—	17
	Full M.	8	SW	29·42	29·37	58	43	—	22
		9	W	29·62	29·42	51	42	—	—
		10	W	29·60	29·48	57	43	—	10
		11	SW	29·65	29·51	54	44	17	—
		12	W	29·49	29·45	54	32	—	35
		13	SW	29·58	29·49	46	29	—	
		14	W	29·58	29·17	43	33	3	8
				30·34	28·64	58	27	0·88	2·14

NOTES.—Tenth Mo. 16. Fine morning: wet p. m.: lightning in the evening. 17. Showery. 18. Fine a. m., shower p. m. 19. Hoar frost: fair day after misty morning. 20. Cloudy a. m., much wind at E. 22. About half-past 7 p. m. a bright blue meteor appeared in the N, and passing to westward with a steady and rather slow motion, became extinct: there were traces of *Cirrostratus* clouds, which increased afterward. 23. Maximum of temperature at 9 a. m.: cloudy, with a breeze. 24. Overcast. 25. Cloudy a. m., clear p. m.: during the twilight there was abundance of red haze, first in the E horizon

NOTES, &c. *(continued).*

over clouds in that quarter, then at a considerable elevation in the W: it ended more clear and orange coloured. 26. Cloudy at intervals. 27. Windy a.m. 28. Hoar frost, which being examined, was found to consist not of spiculæ attached to the herbage, but of the drops of dew frozen clear and solid. 29. Hoar frost: *Cumulostrati* followed by *Nimbi:* one of the latter approaching from the E at 4 p.m., exhibited a double rainbow, on a ground of purple. 30. Spicular hoar forst: very misty: clear at noon: *Cirrostratus* and a little rain p.m.: wet and stormy night. 31. Windy a.m.: *Cirrus* with *Cumulus:* a shower about four, with a fine bow.

Eleventh Mo. 1. Hoar frost. 2. Granular hoar frost: very clear sunrise: clouds at noon: rain p.m., very windy night. 3. Sunshine, a.m. wind NNW, a shower p.m. 6. Calm clear weather, with hoar frost these three days, the wind now rising. 7. Small rain at intervals: a *solar halo* of large diameter p.m. 8. Fair with wind a.m., but before 4 p.m. dark *Nimbi* and rain beginning: being then on the south side of London, I was surprised with a flash of lightning and a sharp peal of thunder: about half-past six, a glimpse of a meteor passing to the W: it was said to lighten after this time. 9. Windy. 11. Stormy night. 12. Windy: cloudy p.m., wet. 13. Hoar frost. 14. The same, with a crystallized rime on the shrubs.

RESULTS.

Winds Variable: the Easterly prevailed in the former, the Westerly in the latter part.

Barometer:	Greatest height	30·34 in.
	Least	28·64 in.
	Mean of the period	29·625 in.
Thermometer:	Greatest height	58°
	Least	27°
	Mean of the period	43·41°
Evaporation		0·83 in.
Rain		2·14 in.

THUNDER STORMS, &c.

Between three and four o'clock on Tuesday morning (Nov. 9), Brighton was visited by a dreadful storm of wind and rain, accompanied by some severe strokes of thunder and vivid flashes of lightning.

* * *

Extract of a letter from an Officer serving in the Mediterranean:—"On the 2d of September, the Hibernia was struck by lightning, which *set fire to the main-top-mast and fore-rigging,* but the rain falling in torrents at the time, shortly extinguished it: five men were knocked down, but none killed. The Swiftsure, Union, Ocean, and Leopard, *all had their main-top-masts shattered to pieces.* Not a life was lost on board any of them, although many men were struck down and slightly hurt."—(PUB. LEDGER).

TABLE LXXXVIII.

	1813.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
11th Mo.	L. Q.	Nov.	15	NW	29·88	29·20	47°	34°	—	
			16	NE	29·10	29·02	45	35	—	13
			17	NW	29·46	29·02	43	30	—	—
			18	W	29·65	29·46	44	32	—	
			19	SW	29·72	29·65	51	37	10	15
			20	S	29·86	29·72	56	49	—	
			21	S	29·88	29·86	55	47	—	
	New M.		22	NW	29·93	29·88	55	37	—	
			23	E	29·98	29·93	45	38	7	
			24	NE	30·08	29·98	45	33	—	—
			25	N	30·08	30·05	43	37	—	
			26	NE	30·05	30·02	45	31	—	
			27	NE	30·02	29·88	43	28	—	
			28	E	29·95	29·85	37	34	—	
			29	E	29·90	29·85	40	25	—	
			30	SE	29·85	29·50	35	29	—	
12th Mo.	1st Q.	Dec.	1	E	29·50	29·42	37	33	—	
			2	SE	29·42	29·09	40	37	12	12
			3	SE	29·37	29·09	43	40	—	—
			4	NE	29·44	29·37	44	40	—	—
			5	N	29·76	29·44	44	36	—	—
			6	N	29·78	29·77	44	36		20
	Full M.		7	NE	29·76	29·72	44	41	2	3
			8	NE	29·86	29·72	44	40	—	—
			9	NE	30·05	29·86	44	39	—	—
			10	NE	30·18	30·05	43	37	4	14
			11	NE	30·18	30·05	42	37	—	
			12	SE	30·05	29·82	37	29	—	
			13	NW	29·93	29·82	37	26	2	
					30·18	29·02	56	25	0·37	0·77

NOTES.—Eleventh Mo. 16. A stormy night, after some rain. 17. Much wind a. m.: snow from 2 to 3 p. m., which remained through the night. 18. A fine day: at sunset much rose colour, with *Cirrostratus*. 19. Overcast at 8 a. m., the barometer falling: misty and drizzling. 22. Grey morning: fair day. 23. Misty, calm. 24. Overcast, drizzling. 25—27. Fine days: at sunset on the 27th, the wind being SE, the smoke of the city, in passing away in a body, swelled up into several distinct heaps, each of which inosculated at its summit with a small cloud: this union was clearly the result of mutual attraction, and it continued for great part of an hour: the clouds which at this time overspread the sky in great numbers were the remains of larger ones, which had in part evaporated, and now resembled *Cirrostrati:* those which were attached to the smoke became sensibly denser than the rest. 30. This month exhibited an unusual proportion of fine days.

Twelfth Mo. 2. Cloudy: a steady breeze: some light snow and sleet: rain in the night. 3. Overcast: some rain. 4, 5. Cloudy, misty: rain at intervals. 8. Small rain a. m.

RESULTS.

Prevailing Winds Easterly.

Barometer:	Greatest height	30·18 in.
	Least	29·02 in.
	Mean of the period	29·728 in.
Thermometer:	Greatest height	56°
	Least	25°
	Mean of the period	39·63°
Evaporation		0·37 in.
Rain		0·77 in.

The latter part of this period has been remarkable for a general prevalence of the diseases commonly attributed to obstructed perspiration. The detail of these belongs properly to the medical reports: it may, however, be suitable here to point out the circumstances which appear to have contributed to this effect. I say *appear*, because there may exist modifications of the air capable of exciting disease, to the discovery of which none of the present means of examination are competent.

The wind, during the time alluded to, came in a moderate stream from the eastward; the barometer, which had been depressed, rising gradually. The sky was almost constantly overcast with *Cirrostratus*; beneath which the atmosphere was perceptibly full of diffused water, of the density of *dew*, quite down to the earth. The sun's rays thus intercepted, the temperature varied little from 40° by day or night; and evaporation was nearly at a stand. Electricity in such circumstances could not accumulate: hence, though it drizzled at intervals, the air never got cleared by showers.

Let us now apply these facts to the case. In health, the matter of perspiration is thrown out on the skin in a fluid state, in quantity and with a force proportioned to the state of the circulation. Here it has to evaporate in the common way of fluids; but it will do this very slowly, even at the common temperature of the skin, in an air already loaded with moisture. In such an air, too, the whole muscular system being relaxed, the heart and arteries act with less force. If it be, at the same time, only moderately cold, and void, in great measure, of light and electricity, it will want that exciting action on the nerves, which results from the *sudden* loss of heat, as well as from the application of the two latter *stimuli*. In a word, such an air, succeeding to a dry and clear air, will be a *sedative*: it will counteract, by constant, though insensible, effects, the healthy energies even of the strong. The usual *sponging* operation on the skin being withheld, at the same time that the *vis a tergo* is lessened, we need not wonder that the matter of perspiration should stagnate in the fine extremities of the cuticular arteries, or be thrown on some internal secreting surface; that the skin should take on a state of spasm, and that fever and local inflammation should ensue. Thus, without supposing in this case any occult quality in the air, we may trace a combination of qualities which may be reasonably thought to have made it productive of disease.

THUNDER STORMS, &c.

The Barfleur of 98 guns, Sir E. Berry, was struck by lightning, the latter end of October, in the Mediterranean. The fluid struck the foretop-gallant-mast, which it shivered to pieces; descended the foretop-mast and foremast, and proceeding through all the decks, tore up part of the lead at the light-room door, which is situated close to the magazine!—The destruction of the ship, however, was providentially averted.

November 17.—A Correspondent at Bridgewater says: "Wednesday last we were visited by a tremendous thunder storm: the lightning struck the spire of the church, and shivered it to pieces, the windows were broken, and the tiles were forced off the houses in every quarter. At Weston Zoyland, a short distance from this, the lightning much damaged the tower of the church; the windows were broken, and the church soon filled with thick smoke, which smelt so sulphureously, that the inhabitants throughout the town were greatly alarmed; the battlements were entirely thrown down, and some of the stones thrown to a distance of 60 yards.

PLYMOUTH, *November* 17.—It has blown a very heavy gale all last night and to-day from NW.

SCILLY, *December* 5.—On the 1st instant we experienced the most violent gale ever remembered, from the SE, but it only lasted a short time. Three vessels in the Roads parted from their cables—no other accident.

(PUB. LEDGER).

INSTANCE OF EXTRAORDINARY DROUGHT.

The island of Aruba, says a letter from Curaçao, of November 3, is at present in a most deplorable condition, on account of the scarcity of rain. *Within the last nine months only five showers have fallen*; and they have been so gentle, as to have had no visible effect on the parched soil. The trees on the island are withered and no longer bear; all traces of vegetation are gradually disappearing; and the efforts to raise corn, or esculent roots, have proved fruitless. A dreadful mortality had taken place among the cattle, as the few springs from whence they had been supplied were exhausted, and there was neither fodder nor water to keep them alive. The principal inhabitants had abandoned the island.

A letter from Curaçao, dated November 5, says:—"During the last ten months there has been no rain in this colony; a famine among the horned cattle has been the natural consequence. More than 1700 head have been lost on some plantations. The lower classes and the slaves have been exposed to the prospect of famine.—(PUB. LEDGER, *February*, 1814).

REPORTED LOSS OF A CARAVAN BY THE KAMSIN, OR HOT WIND OF THE DESERT.

The following is an extract of a letter from Smyrna:—"We have received intelligence of a dreadful calamity having overtaken the largest caravan of the season, on its route from Mecca to Aleppo. The caravan consisted of 2,000 souls—merchants and travellers from the Red Sea and Persian Gulph, pilgrims returning from performing their devotions at Mecca, and a numerous train of attendants, the whole escorted by 400 military. The march was in three columns.—On the 15th of August last they entered the great Arabian Desert, in which they journeyed seven days, and were already approaching its edge. A few hours more would have placed them beyond danger; but alas! they were not permitted to return in safety. On the morning of the 23d, just as they had struck their tents, and commenced their march, a wind rose from the NE, and blew with tremendous violence. They increased the rapidity of their march to escape the threatening danger; but the fatal Kamsin had set in. On a sudden, dense clouds were observed, whose extremity obscured the horizon, and swept the face of the desert. They approached the columns, and obscured the line of march. Both men and beast, struck by a sense of common danger, uttered loud cries. The next moment they fell, beneath its pestiferous influence, lifeless corpses. Of 2,000 souls composing the caravan, not more than 20 escaped this calamity.—They owed their safety to the swiftness of their dromedaries."—(PUB. LEDGER, *December*, 1813).

TABLE LXXXIX.

	1813.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
12th Mo.	L. Q.	Dec. 14	NW	29·93	29·87	35°	25°		
		15	NW	29·87	29·49	38	26		
		16	SW	29·49	29·35	49	40		—
		17	S	29·35	29·14	51	50	2	19
		18	SW	29·16	29·14	54	44		—
		19	SW	29·28	29·16	50	35		
		20	W	29·57	29·28	45	31		
		21	NE	29·50	29·44	46	32	5	12
	New M.	22	SW	29·77	29·50	47	36		
		23	SW	29·89	29·77	47	38		—
		24	SW	30·02	29·89	53	46		—
		25	SW	30·28	30·02	51	41	1	·9
		26	NW	30·49	30·28	41	28		
		27		30·49	30·38	31	25		
		28		30·35	30·31	30	24		
		29		30·36	30·35	30	19		
	1st, Q.	30	NW	30·36	30·32	32	22		
1814.		31	N	30·32	30·17	35	22		
1st Mo.		Jan. 1		30·17	29·86	31	20		
		2		29·86	29·71	32	28		
		3		29·71	29·60	33	29		
		4	E	29·60	29·20	33	25		
		5	NE	29·12	29·08	33	32		
	Full M.	6	N	29·52	29·12	34	15		
		7	NW	29·66	29·60	28	11		
		8	NW	29·65	29·62	31	12		
		9	NW	29·79	29·65	29	8		
		10	NW	29·89	29·79	26	21		
		11	SE	29·89	29·54	25	15		
		12	N	29·88	29·49	27	15	6	1·28
				30·49	29·08	54	8	0·14	1·68

Notes.—Twelfth Mo. 14, 15. Hoar frost: clear days. 16, 17. Cloudy: rain at intervals: bees quit the hive in unusual numbers for the season. 18. Windy: some rain. 19. Very misty a. m. 20. Hoar frost. 21. The same, followed by wind and rain. 23—25. Misty: drizzling rain at intervals. 26. A clear morning, with much dew: the barometer rising fast: *Cirrus* and *Cirrostratus*: orange coloured twilight. 31. Since the 26th we have had a succession of thick fogs, with a calm air, or at most a breeze from the NE: yesterday the air cleared a little, and to-day has been fine: a display of *Cirrus* clouds, with much red in the morning and evening sky: the peculiar smell of electricity has been perceptible of late, when the air cleared up at sunset.

NOTES, &c. *(continued).*

1814. First Mo. 4. The mists, which have again prevailed for several days, and which have rendered travelling dangerous, are probably referable to the modification *Stratus*. The air has been, in effect, loaded with particles of freezing water, such as in a higher region would have produced snow. These attached themselves to all objects, crystallizing in the most regular and beautiful manner. A blade of grass was thus converted into a pretty thick *stalagmite:* some of the shrubs, covered with spreading tufts of crystals, looked as if they were in blossom; while others, more firmly incrusted, might have passed for gigantic specimens of white coral. The leaves of evergreens had a transparent varnish of ice, with an elegant white fringe. Lofty trees, viewed against the blue sky in the sunshine, appeared in striking magnificence: the whole face of nature, in short, was exquisitely dressed out in frost work. When the sun, at length, broke through, and loosened the rime, it fell unmelted, and lay in heaps under the trees; after which a deep snow, brought by an easterly wind, reduced the whole scenery to the more ordinary appearances of our winter. 5. Snow early, and during the day; the wind increasing in force from the NE. 6. A dark morning. Snow falling in some quantity to-day, with the temperature at the surface 33° or 34°, presented an amusing phenomenon, which was pointed out by my children. Instead of driving loose before the wind, it was collected occasionally into a ball, which rolled on, increasing till its weight stopped it: thousands of these were to be seen lying in the fields, some of them several inches in diameter. 9. A somewhat misty morning: the snowy landscape, visible to the distance of about a mile only, exhibited a bluish tint. A thermometer, *placed on the snow*, fell this night to 6°: and I am informed that at Croydon a temperature of 5° was observed by a thermometer at the usual elevation from the ground: the time 11 p. m. 11. Very red sunrise: a steady breeze at SE till evening. Minimum temperature on the snow 11°. 12. *Cumulus* and *Cirrostratus* clouds. Minimum temperature on the snow 12°. The River Lea is now firmly frozen, and the Thames so much encumbered with ice that navigation is scarcely practicable.

RESULTS.

Winds Variable: a considerable interval calm.

Barometer:	Greatest height	30·49 in.
	Least	29·08 in.
	Mean of the period	29·757 in.
Thermometer:	Greatest height	54°
	Least	8°
	Mean of the period	32·36°
Evaporation		0·14 in.
Rain, (with melted snow and rime)		1·68 in.

There was an eruption of Mount Vesuvius, on the 25th and 26th of the twelfth month.

TABLE XC.

	1814.		Wind.	Pressure.		Temp.		Min. on the Snow.	Rain &c.
				Max.	Min.	Max.	Min.		
1st Mo.	L. Q.	Jan. 13	NE	30·13	30·03	30°	14°	8	
		14	NE	30·03	29·61	26	19	14	
		15	E	29·61	29·30	31	20	21	
		16	NE	29·63	29·25	32	22	19	—
		17	N	29·25	29·14	30	11	8	—
		18	E	29·14	29·07	36	30		—
		19	NE	29·42	29·07	34	28		—
		20	NE	29·76	29·42	33	14	6	—
	New M.	21	Var.	29·76	29·72	25	14	11	—
		22	N	29·82	29·71	32	8	6	—
		23	N	29·77	29·69	35	15	11	—
		24	Var.	29·88	29·77	33	24		1·25
		25	Var.	29·88	29·60	36	20		—
		26	SW	29·60	29·22	36	33		12
		27	W	29·16	29·11	39	33		20
		28	Var.	29·11	28·54	40	28		—
	1st Q.	29	Var.	28·94	28·22	41	32		86
		30	W	29·32	28·94	40	25	20	
		31	NW	29·80	29·32	38	26		—
2d Mo.		Feb. 1	NW	30·01	29·90	36	26		6
		2	N	30·04	30·02	41	24	22	
		3	N	30·01	29·98	33	19	2	
	Full M.	4	W	30·15	30·11	32	19	12	
		5	SW	30·11	29·68	38	29		8
		6	NW	29·61	29·51	44	33		4
		7	W	29·65	29·48	40	32		—
		8	SW	29·70	29·36	50	35		5
		9	SW	29·94	29·70	47	40		
		10	SW	29·98	29·94	49	42		
		11	S	29·95	29·90	50	35		
				30·15	28·22	50	8	2	2·66

NOTES.—First Mo. 13. Much wind last night: very fine day: *Cumulus* and *Cirrostratus*. 14. Somewhat cloudy a. m. 15. Overcast with *Cirrostratus:* light breeze. There being no evaporation to-day, the surface of the snow is a little warmer than the air. 16. Overcast: a slight thaw, from the warmth of the earth: at evening snow and frost again. 17. A clear day: *Cirrus* and *Cirrostratus* in the evening, with a low *Nimbus*, or two, forming. At sunset, the temperature being 18°, there was a bed of haze in the E, like that which accompanies the fall of *dew*, but much more dense, and singularly coloured. It was chiefly of an indigo blue, but passed below into opake white, and above into a faint red, more transparent. 18. A snowy morning: small snow and sleet through the day. 19. A snowy day. 20. Snow: the wind strong at NE. 21. At 8 a.m. beginning to snow again. In the drifts the snow is many feet deep. This day proved fine and calm: the wind, at times, SW. 22. A little snow in the morning: fine day: strong breeze, with various clouds. 23. Snow, morning and evening. There was a fine exhibition of clouds: as *Cumuli*, well formed, but with little colour; the superior modifications, including the *Cirrocumulus;* and several distinct *Nimbi.* 24. The sky as yesterday: snow, a.m. the wind brisk: about 2 p.m. a squall, with plenty of snow. 25. A fine elevated grey sky, a.m.: then, *Cirrus* and *Cirrostratus,* the wind veering by N to W. It has had lately much tendency to this quarter at night. 26. A hollow wind at SW: snow, followed by small rain. 27. A misty thaw: a little rain at intervals: wind and rain in the night. 28. Misty a.m., with rain: the wind W: after this a little snow: then fair, and frosty after sunset. 29. Stormy: the wind SE with snow early: then steady rain, followed by more snow. The *minimum* of pressure occurred after 6 p.m. It was not confined to a small space of time. As the barometer began to rise, the wind came round by SW to NW, and blew with great violence till near morning. 30. A fine day: strong breeze, with clouds: at sunset a sprinkling of opake hail. 31. Fair day: but at 7 p.m. a sudden heavy snow shower.

Second Mo. 2. Hoar frost. 3. A very fine sunny day, followed by bright moonlight. A thermometer, at an intermediate height, between the standard one and that on the snow, gave 14° as the minimum. The latter instrument at 8 a.m. had risen only to 4°, and was thickly covered with *rime,* although at night there had been an appearance of strong evaporation. 4. Sunshine, and fair night. About 9 p.m. a colourless halo, of the largest diameter, with *Cirrus* clouds. At half past ten a small coloured halo, with *Cirrostratus.* The temperature on the snow being 12°, the wind W, a breeze, I now exposed in a metallic dish, close to the thermometer, 2600 grains of snow (which had become hard by freezing) in two or three masses. At half past eight, or in ten hours, the temperature having risen to 28°, it had lost 27 grains in weight. 5. Crimson sky at sunrise: hollow wind: snow and sleet. 6. A gale from SW, with showers of rain: at evening it cleared up, and blew from NW. 7—11. *Cirrostratus* and *Cirrocumulus:* red sky at sunrise: gales of wind, and a few showers.

RESULTS.

Winds Northerly in the fore part of the period, variable in the middle, and in the conclusion Southerly.

Barometer:	Greatest height	30·15 in.
	Least	28·22 in.
	Mean of the period	29·591 in.
Thermometer:	Greatest height	50°
	Least	8°
	On the snow, least	2°
	Mean of the period	31·31°
Evaporation (from water containing a little salt)		0·32 in.
Rain and melted snow		2·66 in.

THE THAMES FROZEN OVER.

January 15.—The masses of ice and snow had accumulated in such quantities at London Bridge, on the upper side yesterday, that it was utterly impossible for barges or boats to pass up.

January 20.—During the whole of this week, that part of the Thames below Windsor Bridge, called Mill River, has been frozen over, and has been crouded with persons skaiting.

February 3.—The confidence of the public in the safety of the passage over the frozen surface of the Thames was yesterday increased. All the avenues from Cheapside to the different stairs on the banks of the river were distinguished by large chalked boards announcing "A safe footway over the River to Bankside;" and, in consequence, thousands of individuals were induced to go and witness so novel a spectacle, and many hundreds had, what we cannot help terming the fool-hardiness, to venture on the fragile plain, and walk, not alone over, but from London to Blackfriars' Bridge. Several booths, formed of blankets and sail-cloths, and ornamented with streamers and various signs, were also erected in the very centre of the river, where the visitors could be accommodated with various luxuries. In one of the booths, the entertaining spectacle of a *sheep roasting* was exhibited.

February 7.—Friday several printers brought presses and pulled off various impressions, which they sold for a trifle:—

e. g. "Printed to commemorate a remarkably severe frost, which commenced December 27, 1813, accompanied by an unusual thick fog, that continued eight days, and was succeeded by a tremendous fall of snow, which prevented all communication with the Northern and Western Roads for several days. The Thames presented a complete field of ice between London and Blackfriars' Bridges, on Monday the 31st of January 1814.—A Fair is this day (February 4, 1814), held, and the whole space between the two Bridges covered with spectators."

This "field of ice" was, indeed, a very rugged one, consisting of masses of drift ice of all ~~shapes and sizes,~~ covered with snow, and cemented together by the freezing of the intermediate surface. The deceitfulness of the latter caused (as is too common on such occasions) the loss of some lives by drowning. The following passage, announcing the opening of the river soon after, is worthy of preservation on account of the spirit in which it is written.

February 11.—We are happy to see the lately perturbed bosom of Father Thames resume its former serenity. The busy oar is now plied with its wonted alacrity, and the sons of Commerce are pursuing their avocations with redoubled energy. Cheerfulness is seated on the brow of the industrious labourer: those who were reduced to receive alms as paupers, again taste the sweets of that comparative independence with which labour crowns the efforts of the industrious. What a fruitful source of congratulation does this prospect afford! nor can the contemplative mind dwell on the subject without feeling gratitude to that beneficent Being, who, in a time of such calamity, opened the hearts of the benevolent to administer, from their abundance, to the necessities of their poorer brethren, and thus add cement to the bond by which all mankind are linked together.

The mischief done on the river, during the late frost, is greater than can be remembered by the oldest man living. Among the craft alone, it is calculated to amount to upwards of 10,000*l.* independent of the damage sustained by the cables, tackle, &c. of the shipping.

January 11.—The quantity of snow which has fallen in the upper parts of Hampshire, and on the Hind Head, is very great, lying in many places fifteen feet deep.—(PUB. LEDGER).

Similar accounts of the accumulation of snow, more especially on the western side of the island, as also of the freezing of the large rivers, &c. abounded in the public prints, within two weeks from this date.

In Dublin a fog enveloped the city at the same time that it prevailed here, and was so extremely dense, that a great number of serious accidents were the consequence.

Dublin, January 13.—From the uncommon depth of the snow, the streets appeared yesterday almost deserted: none were to be seen abroad but an occasional messenger, a walking physician, a letter carrier, or a bank runner, scrambling through the snow to their several vocations.

February 21.—A letter from *Heligoland* mentions, that the intense frost had there, as in England, been preceded by thick fogs, and heavy falls of snow. The latter was 10 and 12 feet deep. The frost, which had lasted six weeks, had on the 8th, every appearance of continuance.—(PAPERS).

TABLE XCI.

	1814.		Wind.	Pressure,		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
2d Mo.	L. Q.	Feb. 12	S	29·94	29·92	48°	39°	—	
		13	SE	29·91	29·87	46	37	—	10
		14	NE	30·07	29·91	41	29	—	
		15	NE	30·13	30·07	38	29	—	
		16	NE	30·40	30·13	39	28	—	
		17	NE	30·42	30·39	33	19	—	
		18	NE	30·39	30·25	39	30	—	—
		19	NE	30·41	30·25	40	23	—	
	New M.	20	Var.	30·41	30·35	31	18	—	
		21	SE	30·30	30·25	34	19	—	
		22	E	30·30	30·22	32	21	—	
		23	SE	30·22	30·15	32	18	—	
		24	E	30·20	30·12	33	18	—	
		25	SE	30·12	30·02	34	21	—	
		26	NE	30·08	30·00	35	24	—	
	1st Q.	27	SE	30·00	29·83	39	26	—	
		28	SW	29·83	29·12	41	30	25	3
3d Mo.		March 1	Var.	29·07	29·05	45	31	—	—
		2	SW	29·05	28·97	45	31	—	—
		3	E	29·28	29·05	42	30	—	
		4	NE	29·59	29·28	35	31	—	
		5	NE	29·88	29·59	34	28	—	—
	Full M.	6	NE	29·88	29·77	34	28	—	
		7	E	29·85	29·77	32	21	—	—
		8	NE	29·85	29·76	38	26	—	—
		9	NE	29·76	29·66	34	27	—	—
		10	NW	29·66	29·58	35	29	—	—
		11	NE	29·70	29·45	41	32	—	—
		12	NE	29·99	29·70	39	21	—	
		13	N	30·18	29·99	38	30	28	82
				30·42	28·97	48	18	0·53	0·95

NOTES.—Second Mo. 12. Cloudy. At half past 10 a. m. after a peculiarly unpleasant atmosphere, with a breeze from SE, we had a continued *shower* of fragments of *burnt paper*, descending from an elevation which the eye could not appreciate: it was found to originate from the burning of the Custom House, (distant in a right line about five miles S), at which there happened an explosion of gunpowder. 13. Misty morning. 14. *Cumulus* clouds, beneath *Cirrocumulus* and *Cirrostratus*. 15. Fine morning: *Cumulus:* breeze: evening twilight clear orange, and the stars brilliant. 16. Cloudy morning: strong breeze: fine clear day. 17. Fine day: *Cumulus* with *Cirrus*. 18. Much hoar frost: fine morning: some rain, evening. 19, 20. Hoar frost. 21. The same: the moon visible, and very well defined at 6 p.m. 22, 23. Hoar frost. 24. The same: *Cirrus* clouds, in parallel stripes from N to S all day: minimum temperature at the laboratory, Stratford, 15°. 25—27. Hoar frost: *Cirrus*, in stripes from N to S: lunar halo. 28. *Cirrostratus* appears: the stones grow moist, and the wind has a hollow sound.

Third Mo. 1. Damp and cloudy: hollow wind: sleet, p.m. 2. Rain and sleet at intervals. 3—8. Snow at intervals: the country has become again white with snow. 9. Snow, more plentiful, in the night. 10—12. Snow at intervals: which, in northern exposures, lies to some depth.

RESULTS.

Prevailing Winds Easterly.

Barometer:	Greatest height	30·42 in.
	Least	28·97 in.
	Mean of the period	29·889 in.
Thermometer:	Greatest height	48°
	Least	18°
	Mean of the period	31·93°
Evaporation (the water in the gauge being most of the time solid)		0·53 in.
Rain and melted snow		0·95 in.

STORMS.

Monday morning, February 21, about four o'clock, the town of Uttoxeter was much alarmed by a most violent storm of wind and hail, which was immediately succeeded by a blaze of lightning, particularly remarkable for its duration. The report which accompanied it resembled the firing of three cannons in quick succession.

PLYMOUTH, *March* 13.—Arrived the Insolent brig, of 14 guns, Captain Brasier, from Passages, having thrown her guns overboard, and sustained considerable damage in her masts and rigging, in a tremendous gale, which commenced in the Bay of Biscay on the 28th ult. and continued to the 4th inst.

DESTRUCTIVE INUNDATION IN THE EAST INDIES.

Extract of a letter from Surat:—"Accounts have been received from Gurry, which mention a dreadful calamity, but, alas! of too frequent occurrence in this country. On the 12th of February, the Nerbudda unexpectedly, and during the night overflowed its banks, and swept away upwards of 15 villages. The calamity was so sudden that the inhabitants, their houses, furniture, and cattle, shared one common fate. It is difficult to compute the number of human lives lost; but it is supposed to exceed three thousand."—(PAPERS).

TABLE XCII.

	1814.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
3d Mo.	L. Q.	March 14	NE	30·34	30·22	36°	30°	—	
		15	NE	30·42	30·34	37	30	—	
		16	NE	30·42	30·32	40	29	—	
		17	NE	30·32	30·23	39	28	—	
		18	NE	30·23	30·06	37	29	—	
		19	NE	30·06	29·78	35	30	—	
		20	SE	29·78	29·65	49	35	—	
	New M.	21	SE	29·65	29·60	45	41	12	38
		22	SW	29·75	29·60	55	35	—	—
		23	SW	29·75	29·73	55	34	—	—
		24	SW	29·61	29·59	48	40	—	—
		25	W	29·61	29·60	54	35	—	—
		26	SW	29·80	29·60	55	41	—	
		27	W	29·84	29·80	59	36	—	—
	1st Q.	28	Var.	29·84	29·50	59	40	25	10
		29	SE	29·75	29·50	52	35	—	
		30	SW	29·87	29·75	60	31	—	36
		31	SE	29·87	29·60	54	45	—	36
4th Mo.		April 1	SW	29·60	29·34	60	42	—	15
		2	W	29·37	29·31	56	41	—	6
		3	SW	29·58	29·37	57	32	—	
	Full M.	4	NW	29·70	29·58	58	34	—	
		5	Var.	29·90	29·70	59	38	—	
		6	W	30·00	29·90	61	38	—	
		7	SE	30·20	30·00	64	40	—	
		8	NE	30·20	30·16	63	32	—	
		9	N	—	—	—	—	—	
		10		30·20	29·93	63	43	—	
		11	NE	29·93	29·83	62	36	83	
				30·42	29·31	64	28	1·20	1·41

NOTES.—Third Mo. 14—19. Dull cloudy weather: the latter a misty day. 20. More clear and spring-like, after a misty morning. *Cirrus*, passing to *Cirrocumulus* and *Cirrostratus* 21. Rainy: the morning opened with *Cirrostratus* lowering. 22—25. Variable spring-like sky: large *Cumulus* clouds, inosculating with *Cirrocumulus* and *Cirrostratus:* the *Nimbus* appeared occasionally: the air nearly calm, with little evaporation, the mean temperature considered. 27. Overcast a. m., with *Cirrostratus:* a few drops of rain: p. m. large *Cirri:* sunshine and clouds. 28. Fair a. m., with *Cirrus* and other light clouds. 29. Overcast: *Cirrostratus,* with *Cumulus* and large *Cumulostratus* clouds. 30. The evaporation is now considerable: wind and rain by night. 31. Fine morning: wet forenoon: fair afternoon: thunder clouds appear.

Fourth Mo. 1. Cloudy a. m., with a few drops: a fine day: the *Cumulus* inosculates with the superior clouds: wind and rain by night. 2. Windy morning: squalls with rain, p. m.: a *Nimbus* on the NW horizon, with much wind at sunset. 3. Windy a. m.: *Cumulus* with *Cirrostratus:* p. m. *Cirrus* only, with a brisk evaporation. 4. Morning overcast with the lighter modifications. 5—11. Fair weather: generally misty mornings, with much dew, and clear days: the roads are become already quite dusty by the brisk evaporation.

RESULTS.

Winds Variable.

Barometer:	Greatest height	30·42 in.
	Least	29·31 in.
	Mean of the period	29·842 in.
Thermometer:	Greatest height	64°
	Least	28°
	Mean of the period	44·14°
Evaporation		1·20 in.
Rain		1·41 in.

The frost may be said to have gone off in the first week of the present period, and the mean temperature having steadily advanced since, the latter week has been seasonably warm.

LEGHORN, *April* 5.—On the morning of the 30th, we had three shocks of an earthquake here. No lives were lost, but several buildings were damaged.

(PUB. LEDGER).

TABLE XCIII.

	1814.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
4th Mo.	L. Q.	April 12	N	29·83	29·76	71°	39°	—	
		13	SE	29·76	29·62	74	42	—	—
		14	S	29·62	29·48	70	43	—	
		15	SE	29·44	29·42	69	46	—	—
		16	S	29·42	29·23	65	47	—	30
		17	S	29·54	29·23	62	40	—	—
		18	SW	29·59	29·43	66	39	—	
		19	SE	29·65	29·59	64	43	—	
	New M.	20	SE	29·65	29·64	68	48	78	15
		21	SW	29·73	29·64	62	39	—	13
		22	NW	29·96	29·73	57	35	—	
		23	SW	29·96	29·74	59	42	—	25
		24	NW	29·80	29·74	55	41	—	3
		25	NW	29·86	29·80	51	40	—	—
	1st Q.	26	NW	30·10	29·86	55	33	37	13
		27	NW	30·12	30·09	56	41	—	3
		28	SW	30·09	30·04	52	43	—	12
		29	SE	30·00	29·98	60	46	—	—
		30	SW	30·10	30·00	64	42	—	
5th Mo.		May 1	Var.	30·12	30·10	68	48	—	
		2	E	30·05	30·00	60	44	—	
		3	E	30·00	29·83	63	41	—	
	Full M.	4	SE	29·83	29·70	57	36	70	
		5	Var.	29·70	29·28	53	40	—	—
		6	Var.	29·70	29·28	63	45	—	66
		7	NE	29·95	29·70	67	45	—	—
		8	W	30·14	29·95	69	43	—	
		9	NE	30·27	30·14	57	35	—	
		10	NE	30·42	30·27	55	33	30	
				30·42	29·23	74	33	2·15	1·80

NOTES.—Fourth Mo. 12. *Cirrus* clouds, passing to the intermediate modifications: the dust is become so dry and light that the air is filled with it: this is in part to be ascribed to electrical action. 13. Various clouds appeared a. m., including the *Nimbus:* and a few drops of rain fell: thunder clouds p. m.; a coloured twilight. 14. Clouds of various modifications. 15. A few drops a. m,: a swallow appeared on the wing: p. m. steady rain. 16. Much wind: showers. 17. Steady rain in the morning: wind S, hollow and murmuring; after this large *Cumulus* clouds (beneath *Cirrus*), which in the evening rapidly evaporated or dispersed; an *Aurora Borealis* ensued. (See the Note).

18. Wet morning and evening: much *Cumulus* appeared to-day, intermixed with *Cirrostratus* in the region of its base, an appearance very unusual. 19. *Cirrostratus* a. m.: day fine: a *lurid* sunset, the disk showing enlarged, through spots and lines of *Cirrostratus*. 20. Clouds a. m., beneath an elevated haze, in which were discernible streaks from N to S: rain in the night. 21. The clouds inosculating a. m.: rain ensued in the evening. 22. Windy: *Cumulostratus*: a brisk evaporation. 23. Shower p. m.: rain in the night. 24. Windy: small rain. 25. Overcast: showery. 26. After a shower, various clouds through the day, and a rainbow: at sunset a beautiful *Cumulostratus* in the SE, reflecting the splendour of the twilight. 27. Cloudy: rain to the SW. 28, 29. Wet mornings. 30. A grey elevated sky.

Fifth Mo. 1. Windy. 2. Overcast a. m.: then fair, with *Cirrus*. 4. Cloudy morning. 5. The same: a windy and very wet day: the rain mixed at intervals with sleet and hail. 6. Showers, attended with the union of clouds in different strata. At sunset an appearance of extensive rain in the E, with groups of *Cumulus* and *Cirrostratus* before it. In the N and W these had, intermixed and adhering, a transparent brown-red haze, distinguishable from the substance of the cloud, and which gave a pink tinge to the twilight, elsewhere of the usual lemon colour. At the same time a *Stratus* arose in the meadows. 7. A misty morning: while the earth presents the aspect of spring, the sky of late is quite autumnal: showers again passed by in the E. 8. Cloudy morning: rain in the S and E: *Cumulus* clouds, uniting with *Cirrus* above. 9. Overcast sky.

RESULTS.

Winds Variable.

Barometer:	Greatest height	30·42 in.
	Least	29·23 in.
	Mean of the period	29·770 in.
Thermometer:	Greatest height	74°
	Least	33°
	Mean of the period	51·39°
Evaporation		2·15 in.
Rain		1·80 in.

AURORA BOREALIS.

Fourth Mo. 18. The *Aurora Borealis*, of late years a very unfrequent visitant in these parts, appeared last night, with no great degree of splendour, but with the usual characteristic marks of this phenomenon. About 11 p. m. when my attention was first called to it, there was a body of white light, in part intercepted by clouds, extending at a moderate elevation from the N to the NW, with a short broad streamer rising from each extremity. After this it became an arch, composed of similar vertical masses of fibrous light, which moved along in succession, preserving their polarity and curved arrangement. One large streamer in particular, went rapidly through nearly the whole length of the arch from W to E, in which direction the rest chiefly moved. Some of these masses were rather brilliant, and one exhibited colours. After some cessation, and a repetition of this appearance, carried more towards E and W, the light settled in the N, and grew fainter: in which situation, at midnight, I ceased to observe it.

THUNDER STORMS, &c.

During a thunder storm at *Mantua*, on the 20th of March, a flash of lightning penetrated the theatre. Four hundred people were in the house, two of whom were killed, and ten were struck senseless, but afterwards recovered. The electric fluid melted the brass wire, also several gold and composition ear rings and watch keys, without hurting the wearers, and split the diamonds of two ladies of rank.

Friday, during a most tremendous storm of thunder and lightning, an electric bolt fell on the summit of a closely compacted rick of hay, the property of Mr. Jordan, of Cheltenham, which it perpendicularly pierced, penetrating several feet in the earth. The aperture it made at the summit was about three feet in circumference, but it lessened in its progress downwards to about six inches, and was much diminished at the base of the mow. A sulphureous effluvium arose from the rick, which was diffused for several yards round.

(PUB. LEDGER, *April* 14).

Admitting the facts here related (and there is nothing on the face of the accounts to lead us to dispute them) they present two curious instances of the surprisingly varied operations of the electric fluid. To split a *diamond*, even with a knife and hammer, in the direction of the *laminæ* of which it consists, is an easy operation; and this cristallized and combustible substance being a non-conductor, we ought to expect such an effect occasionally, from a powerful stroke of electricity: but to perforate instantaneously a closely compacted *hay rick* is a more difficult task, and, considering the elastic nature of dried grass, would probably baffle the force of the heaviest ball from a cannon. The most probable solution of the fact seems to me to be this; that the substance of the hay was dispersed into the air by a *returning stroke* proceeding from the earth at the base of the hay rick to the clouds above. The true date of this occurrence is probably the first of the month. It will be seen that I noted thunder clouds on the preceding day.

SUPPOSED EARTHQUAKE.

We have heard, from most respectable authority, that a convulsion of the earth, exactly similar in effect and appearance to an earthquake, was sensibly perceived about ten minutes before eight o'clock, on Thursday night last, at Knill Court, Harpton, Norton, and Old Radnor, Radnorshire; at Knill Court, the oscillation of the house was plainly perceptible, and felt by all the family, and that too in several apartments, and was accompanied with a peculiar rumbling noise. At Harpton, a severe storm of thunder and lightning was experienced the same night, and at the same time.—(PUB. LEDGER, *January* 27).

I insert this report, under some uncertainty as to the date (though it appears to have been some time in the first month of this year) for the sake of the following remark. I do not apprehend that these local tremors of the ground in the time of thunder storms are to be classed with real earthquakes. I have stood at the distance of six or seven miles from the extremity of a most extensive and violent thunder storm, visible from Plaistow, and have sensibly felt the ground shake under my feet at the time of the nearer discharges, owing, as I conclude, to the circumstance of the electrical action taking place between the clouds and the thick *substratum* of indurated clay on which the country hereabouts reposes. Such strokes as penetrate but a little below the surface I suppose to excite a lateral tremor proportionally less extensive.

The reader will find two cases forward, in my own observations, of a nature similar, I conclude to the present, under the dates of Tenth month 7, and Twelfth month 14, 1816.

TABLE XCIV.

	1814.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
5th Mo.	L. Q.	May 11	NE	30·42	30·28	57°	34°	—	
		12	NE	30·28	30·08	58	40	—	—
		13	N	30·08	29·97	52	42	10	21
		14	N	29·97	29·93	55	42	—	
		15	NE	29·94	29·89	59	34	—	
		16	SE	30·06	29·94	62	40	—	
		17	NE	30·09	30·06	68	43	—	
		18	E	30·06	30·04	68	40	40	
	New M.	19	SE	30·04	29·85	70	41	—	
		20	SE	29·85	29·70	62	42	—	
		21	SE	29·70	29·48	60	36	—	
		22	SE			52	39	—	
		23	NW			54	41	—	—
		24	NW			46	41	—	—
		25	NW	29·87	29·57	58	31	—	—
	1st Q.	26	NE	29·87	29·83	63	33	—	
		27	NE	29·83	29·58	66	39	—	
		28	NE	29·65	29·56	70	39	—	1·75
		29	NW	29·96	29·65	70	42	—	
		30	NW	30·01	29·96	63	48	—	
		31	SW	30·01	29·94	67	46	1·00	
6th Mo.		June 1	SE	29·94	29·79	58	47	—	—
		2	E	29·80	29·73	53	46	—	—
	Full M.	3	E	29·75	29·65	55	50	—	—
		4	NE	29·90	29·75	55	45	—	77
		5	NE	30·07	29·90	54	44	—	—
		6	NE	30·07	30·00	55	43	—	—
		7	NE	30·00	29·91	58	40	—	—
		8	NE	29·97	29·89	67	41	—	
		9	NE	30·03	29·97	70	36	55	
				30·42	29·48	70	31	2·05	2·73

NOTES.—Fifth Mo. 13, 14. Cloudy: much wind. 15. Cloudy and windy: the *Cumulostratus* prevails. 16, 17. Misty mornings. 18. A breeze a. m. from the NE, with *Cirrus*, *Cirrocumulus*, and *Cirrostratus* clouds. 19. A clear morning. 24. A very wet day and night. 25. A *Stratus* on the low grounds at night. 26. Ice on the pools of standing water this morning to the thickness of $\frac{1}{10}$ of an inch.

Sixth Mo. 2. A slight shower last evening: and this morning small rain. 8. Much wind: cloudy.

RESULTS.

Prevailing Winds Easterly.

Barometer:	Greatest height	30·42 in.
	Least	29·48 in.
	Mean of the period	29·910 in.
Thermometer:	Greatest height	70°
	Least	31°
	Mean of the period	50·50°
Evaporation		2·05 in.
Rain		2·73 in.

The minimum of the barometer for this period is somewhat uncertain, from the loss of three days observations about the time of its occurrence: the depression was followed by frost, as is frequently the case when much rain has fallen. The first of the present month was a contrast to the same of last year, when the thermometer rose to 85°; yet it is observable that the same low temperature occurred then also four days afterwards. On the whole this period has been more changeable than we should have expected with an easterly current prevailing, and full 6° colder than the corresponding one of 1813, in which westerly winds predominated. Birds of song are remarked to have been less heard than usual; a circumstance perhaps ascribable to their number having been reduced by the severity of the winter.

Cold in Russia.

An extract from a letter, dated Moscow, May 13, (25th), says:—"The weather here is worse than the oldest person alive recollects at this season. It snows generally every day, more or less, and sometimes the whole day: *last night the ice was half an inch thick.* Every body is alarmed for the consequences in regard to the agriculture of the country. The roads are next to impassable."

By accounts from Archangel, of the 17th of June, we learn, that the last winter had made greater inroads into the summer of that northern latitude than ever had been known in the memory of man. The ice of the Dwina had not broke up till the 24th of May, and even in the middle of June the White Sea was full of drift ice.—(Pub. Ledger).

Ice Islands in the Atlantic.

The following is an extract of a letter from Halifax, dated the 31st of May, 1814:—"The convoy under the Spencer, bound to Quebec, on the 14th of May, in lat. 44° 18′ N, long. 50° 50′ W, fell in with upwards of 90 large islands of ice, some of which were 80 feet above the surface of the water, and about two acres in extent. In the afternoon of the same day, the convoy met a field of ice, computed at 20 *miles extent, and about* 30 *feet above the* *water's level*, some parts being considerably higher; most happily these were discovered in clear weather, and in the day time. For several days prior, and many subsequent to the 14th May, the fogs were so intense that one ship could not discern another, within the range of half cable, so that many of the convoy would have been wrecked, had the 14th proved as foggy. Happily, the wind was fair, and the atmosphere clear and frosty, and before night the convoy was considered out of danger.—(PUB. LEDGER).

TORNADOES.

[*From an American Paper.*]

I communicate the following, chiefly on account of one or two circumstances attending those phenomena of Nature, which I do not recollect to have noticed in any description I have seen.

Two Tornadoes passed in this vicinity on Saturday last, (June 4), attended with their usual destructive effects on the timber, and razed the few buildings in their course to the foundations, destroying fences, corn, &c. In crossing the Ohio River, the water was taken out, and fish of every description were thrown upon the land.

The courses of the two were nearly parallel and simultaneous, about 15 or 20 miles apart, proceeding from SW to NE. One passed through the prairies on Little Wabash, and was beyond our sight. The other passed in plain view, distant, on the first appearance, about three or four miles, and, from the levelness of the country, was visible for many leagues in its progress. Its shape was much like that of a cone, or a sugar loaf, with the small end downwards, or rather like a speaking trumpet, its upper part flaring considerably as it joined the cloud above. It was as black as pitch, and appeared to boil like that substance over a furnace. The cloud above was also very black. The extent at the bottom of the Tornadoes has been ascertained to have been between half a mile and a mile.

A singular circumstance, observed by myself, and others, who were within half a mile, was this—that the most vivid flashes of lightning were seen to pass between the heavens and earth in quick succession, just in front and rear, and sometimes through the body of the Tornado (or perhaps around it, in a line from it to our eyes), and still no peals of thunder were heard from them. I do not think I ever saw so broad and vivid flashes before in my life. Indeed, I never before had so deliberate and fair a view of a phenomenon of this nature.

It has occurred to me, and I submit it to philosophers to decide, whether the extreme velocity of the air within the whirl, did not prevent the vibrations (or undulations) by which sound is conveyed, from being communicated to the tranquil air without? Were not the vibrations carried round and round within the Tornado and there expanded? This opinion is confirmed to me, by the recollection of what I have heard persons say, who have been in Tornadoes, that there is a continual loud, thundering sound—which I think is produced by the electrical concussions within the whirl. They hear it continually—those out of it hear nothing, even from the fiercest flashes of lightning.

I will mention but one other circumstance—the hail stones which fell in these Tornadoes were as large as a man's two fists. They were tried to be put into a pint tin cup, and would not go in. Hail of this dimension may be formed, by being long borne up and driven round through a moist medium by the whirling wind, before being let down to the ground: whereas, by descending in a direct line, or nearly so, it can never become so large.

S. GRISWOLD.

Shawnoetown, Illinois Territory, June 9, 1814.

In another part of this work I may revert to this interesting description, and make some observations on the nature of these terrible whirlwinds. In the mean time it must be apparent that, whatever be their primary cause, the effects are most extensive and complicated. To the utmost mechanical force of air in motion, we see joined an extremely rapid condensation of its moisture, attended with a proportionate developement of electrical phenomena. The great breadth of atmosphere through which the whole extends is another important consideration: and it would be but a superficial view of the subject that should lead us to ascribe all this to the accidental meeting of two opposite currents in the lower atmosphere.

TABLE XCV.

	1814.		Wind.	Pressure.		Temp.		Evap.	Rain, &c,
				Max.	Min.	Max.	Min.		
6th Mo.	L. Q.	June 10	E	30·03	29·80	69°	42°	—	
		11	E	29·80	29·70	69	48	—	—
		12	E	29·94	29·70	74	48	—	—
		13	E	30·01	29·94	67	55	—	—
		14	W	30·01	29·82	85	53	50	1·00
		15	S	29·87	29·75	78	52	—	—
		16	NW	30·00	29·92	71	43	—	—
	New M.	17	NW	30·04	29·92	68	52	—	—
		18	NW	30·02	—			—	—
		19	NW	—	29·74	66	42	26	38
		20	NW	29·74	29·58	65	48	—	
		21	NW	29·83	29·77	59	49	—	7
		22	NW	30·07	29·83	60	49	—	—
		23	NW	30·20	30·07	62	47	—	2
	1st Q.	24	NE	30·27	30·24	60	41	—	—
		25	NW	30·24	30·04	63	49	30	—
		26	NW	30·01	29·99	62	48	—	—
		27	NW	30·01	29·94	65	49	—	8
		28	NW	29·94	29·84	74	47	—	
		29	S	29·86	29·80	71	55	20	
		30	NW	29·86	29·81	74	47	—	
7th Mo.		July 1	SW	29·90	29·82	70	46	—	
	Full M.	2	NW	29·94	29·90	74	42	—	
		3	NW	29·95	29·93	79	50	33	
		4	NW	29·95	29·94	75	58	—	—
		5	NW	29·96	29·94	81	50	—	6
		6	SW	29·96	29·88	79	49	—	
		7	SW	29·82	29·78	73	63	—	—
		8	SW	29·78	29·67	69	62	—	—
		9	SW	29·67	29·67	72	63	50	13
				30·27	29·58	85	41	2·09	1·74

Notes.—Sixth Mo. 10. A shower in the night. 11. Misty morning, with a smell of electricity in the air: *Cumulus* and *Cirrus* prevail. 12. Showers. 13. A *Stratus* in the meadows: thunder clouds afterwards appeared in the horizon; and, at 11 p. m. lightning. 14. A thunder storm very early, with much wind, and heavy rain mixed with hail. 15. Wet morning: evening cloudy and windy. 21—23. Windy, and overcast, with *Cumulostratus* and *Cirrostratus*. A fire in the grate has been again acceptable. 24. A shower early: this evening the cloudy canopy passed off, with a definite boundary to the S, where, at the same time, it appeared to be raining. 25. Again overcast, with *Cumulostratus*, and windy: much honey dew on the lime trees. 26. A shower this evening. 27. The same. 28. Cloudy, calm: vane at N: *Cumulostratus*, very heavy in the middle of the day, but which cleared off in the evening. 29. Misty morning: clouds as yesterday. 30. Much sun to-day.

Seventh Mo. 1. *Cirrostratus* and *Cirrocumulus*, with some appearance of the *Stratus* at night. 2. a.m. Plumose *Cirri* of uncommon beauty, with *Cumuli* beneath them: the latter prevailed through the day. 3. Clear morning: the *Cumulostratus* again prevails. 4. Large ill-defined *Cirri* filled the sky this morning: various denser clouds succeeded. 5. Rain by half past six; then cloudy and fair: at evening the sky cleared, with the wind W, and an orange twilight. 6. Loose driving *Cumuli*: brisk wind: clear twilight, with little colour. 7. Much wind: *Cirrus* passing to *Cirrostratus*, with *Cumulus* beneath, the whole formed to windward: in the evening a few drops of rain. 8. Wet, a.m.: fair, p.m.: windy night. 9. Windy, cloudy: dripping at intervals: the quickthorn hedges are in many parts quite stripped of their leaves by caterpillars.

RESULTS.

Wind chiefly from the North-West.

Barometer:	Greatest height	30·27 in.
	Least	29·38 in.
	Mean of the period	29·90 in.
Thermometer:	Greatest height	85°
	Least	41°
	Mean of the period	60·01°
Evaporation		2·09 in.
Rain		1·74 in.

TABLE XCVI.

	1814.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
7th Mo.	L. Q.	July 10	S	29·83	29·67	67°	44°	—	16
		11	SW	30·03	29·83	76	51	—	17
		12	NW	30·05	30·02	74	54	—	—
		13	NW	30·02	29·77	70	48	—	
		14	NW	29·77	29·68	69	48	—	—
		15	W	29·63	29·62	74	52	36	—
		16	NE	29·87	29·63	66	50	—	7
	New M.	17	SE	29·87	29·85	73	48	—	14
		18	SW	29·84	29·83	75	48	—	15
		19	NW	29·83	29·62	74	57	—	
		20	SW	29·70	29·56	74	56	—	2
		21	NW	29·87	29·70	78	56	40	—
		22	NW	30·07	29·87	69	50	—	
		23	SW	30·15	30·09	82	52	84	
	1st Q.	24	SW	30·09	29·83	78	55	—	
		25	SE	——	——	84	61	—	
		26	NW	30·05	29·90	80	60	—	
		27	SE	30·05	29·98	83	70	—	
		28	SE	29·98	29·89	91	66	1·08	—
		29	SW	30·05	29·90	71	56	—	—
		30	NW	30·10	30·05	72	65	37	
		31	W	30·10	29·98	79	54	12	17
8th Mo.	Full M.	Aug. 1	NW	30·10	29·98	80	59	—	
		2	NW	30·10	30·05	76	64	—	
		3	SW	30·14	30·05	79	55	—	—
		4	SW	30·14	29·98	77	62	·73	
		5	SW	29·98	29·86	76	58	—	—
		6	W	30·05	29·98	69	57	—	—
		7	SW	29·98	29·80	70	60	57	23
				30·15	29·56	91	44	3·97	1·11

Notes.—Seventh Mo. 10. Rain came on gradually this morning, and continued the whole forenoon, after which appeared the *Cumulus* with *Cirrostratus:* the twilight was luminous, with faint horizontal streaks. 11. Wet afternoon: then *Cirrostratus.* 12. Clear morning: after which different strata of clouds inosculating, followed by a slight shower: a little of the *Cirrocumulus.* 13. *Cumulostratus* through the day, changing at evening to *Cirrostratus:* a strong breeze. 14. Clear morning: then *Cumulostratus,* with a breeze. 15. Various modifications of cloud: the day at length overcast, with one or two very slight showers, and more rain in the night. 16. *Cumulostratus* a. m.:

slight showers p. m.: the wind variable: a *Stratus* at night. 17. Misty morning, after which various clouds, with the wind E: inosculation followed, and a heavy shower in the evening: an electrical smell was perceived at different intervals to-day. 18. Windy: showers through the day. 19. *Cumulostratus*, after some sunshine: at evening the lighter modifications prevailed, including *Cirrocumulus*, in a turbid sky. 20. Wind S a. m., hollow and threatening rain: some showers followed, after which the clouds separated, shewing several modifications, distinct, and well formed. 21. Fine morning, with *Cumulus*: groups of thunder clouds formed p. m., chiefly to the E: but at sunset the electrical character gave place to *Cirrostratus* and wind. 22. After a clear morning the *Cumulostratus*, which has so long predominated, with its usual attendant, a strong breeze of wind. 23. A nearly serene day. 24. Clear day: a breeze from SE. 27. Some lightning at night. 28. (At Tottenham, the thermometer rose to 92·5°: the observations for the latter half of this period were made at the Laboratory, Stratford). Frequent vivid lightning in the evening. 29. Some lightning this morning, with rain: a strong breeze from the SW all day.

Eighth Mo, 3. A few slight showers in the evening. 7. Day showery, with brisk wind.

RESULTS.

Prevailing Winds Westerly.

Barometer:	Greatest height	30·15 in.
	Least	29·56 in.
	Mean of the period	29·918 in.
Thermometer:	Greatest height	91°
	Least	44°
	Mean of the period	65·5°
Evaporation		3·97 in.
Rain		1·11 in.

HAIL STORM.

The storm (says a Stamford paper) which alarmed this town and neighbourhood on Thursday night the 28th ult. was felt with much greater severity in some parts of Leicestershire. Its course seems to have been from SW to NE. At Reasby, between Leicester and Melton Mowbray, it began before ten o'clock, with such a wind and hail, followed by such thunder and lightning, as horror struck every person in the parish. The hail stones were bigger than hens' eggs; many window frames have been beaten in at Reasby, Syston, Thrussington, and Hóby, and fields of corn totally destroyed. Of course the demolition of glass in windows facing the direction of the storm has been general in those places.—(PUB. LEDGER).

TABLE XCVII.

	1814.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
8th Mo.	L. Q.	Aug.	8	W	29·62	29·61	73°	50°	—	5
			9	W	29·82	29·62	69	52	—	—
			10	W	29·97	29·82	72	48	—	13
			11	W	30·05	29·97	73	56	75	1
			12	SW	30·05	29·97	77	56	—	
			13	SW	29·89	29·77	74	51	27	—
			14	NW	29·76	29·74	70	49	—	
	New M.		15	SW	29·83	29·80	70	52	—	
			16	S	29·75	29·75	67	46	—	40
			17	W	29·90	29·84	71	57	58	
			18	W	29·98	29·92	76	53	—	—
			19	NW	29·99	29·88	70	43	—	—
			20	NW	29·98	29·92	70	49	34	
			21	SW	29·87	29·77	70	53	—	2
	1st Q.		22	SW	29·79	29·75	76	55	—	4
			23	SW	29·64	29·54	79	52	—	—
			24	N	29·57	29·40	63	55	39	1·21
			25	SW	29·60	29·40	71	51	—	28
			26	NW	29·78	29·70	67	43	—	—
			27	NW	29·87	29·85	66	43	—	
			28	N	30·00	29·91	65	37	55	
			29	NW	30·09	30·07	68	46	—	
	Full M.		30	W	30·17	30·10	73	57	—	
			31	NW	30·24	30·17	71	58	30	
9th Mo.		Sept.	1	E	30·24	30·20	68	58	—	
			2	NE	30·20	30·10	72	49	—	
			3	NE	30·18	30·10	65	45	32	
			4	NE	30·15	30·10	65	41	—	
			5	N			65	52	—	
			6	NW			65	54	42	17
					30·24	29·40	79	41	3·92	2·31

NOTES.—Eighth Mo. Rain last night: a stiff breeze, a. m.: rain, p. m.: a large *Nimbus* in the SW, and a transient bow in the evening. 9. The breeze continues, with *Cumulus* and *Cumulostratus:* after a drizzling shower or two, a calm evening, with *Cirrocumulus.* 10. The night was overcast: *Cumulus* a. m.: and *Cumulostratus,* with repeated showers p. m., passing off very heavy to the E at sunset. 11. Morning cloudy: evening close, with a *Stratus* forming at sunset. 12. Cobwebs on the grass with the dew: cloudy a. m.: clear at noon: evening calm: a fine plumose *Cirrus* in the N. 13. A few drops of rain this evening. 15. Drizzling rain: the wind veered to S in the night:

heavy showers from nine to twelve, when it cleared up, the wind turning to the westward. 17. Fine morning, with a light wind, WNW: *Cirrocumulus* prevails, with other clouds. 18. *Cirrus* and *Cirrocumulus:* light showers: at sunset the lower edges of the clouds exhibited a deep red. 19. *Cumulostratus,* with some light showers. 20. Morning calm: much dew: the first feeling of autumnal cold: at sunset a group of dense *Cirri* in the NNW, casting shadows into the atmosphere: a *Stratus* in the marshes. 21. Towards evening some light showers from low driving clouds. 22. *Cirrostratus* in the N horizon, a.m.: and at sunset a singular one in the W. 23. Some rain in the night: *Cumulostratus,* with showers: close and warm. 24. *Cumuli,* hung like curtains round the horizon: little air stirring: *Cirri* formed above, moving briskly from the NW, with the vane at N: soon after 11 a.m. it began raining, continuing to rain incessantly through the day, and at intervals through the night also. 25. A magnificent display of *Cumulostratus* this morning, followed by repeated showers: p.m. a thunder shower, the wind changing to W. 26. Some rain during the night: wind brisk and cool: *Cumulus* and *Cumulostratus:* the sky at sunset ruddy orange, reflecting a bronze hue from the eastern clouds. 27. The night was serene: a *Stratus* this morning, with a plentiful dew: *Cirrocumulus* appeared alternately with *Cumulostratus:* a few large drops of rain at 2 p.m.: evening calm: clear sunset. 28. Morning almost cloudless: a fresh breeze from N: much dew and cobwebs on the grass: *Cirrocumulus* in the evening, beautifully illuminated by the setting sun. 29. Misty morning: dew and cobwebs: fine day. 30. Grey morning, calm, cloudiness in the north.

RESULTS.

Prevailing Winds Westerly.

Barometer:	Greatest height	30·24 in.
	Least	29·40 in.
	Mean of the period	29·88 in.
Thermometer:	Greatest height	79°
	Least	41°
	Mean of the period	60·20°
Evaporation		3·92 in.
Rain		2·31 in.

I am indebted for most of the observations contained in this period to the kindness of my brother, William Howard, by whom they were made, in my absence, at Tottenham. It appears there was a tremendous *hail storm* at Coventry, on the 24th of eighth month.

TABLE XCVIII.

	1814.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
9th Mo.	L. Q.	Sept. 7	SW	29·94	29·67	62°	50°	—	37
		8	NW	30·05	29·94	65	50	—	
		9	N	30·06	30·05	64	49	—	—
		10	N	30·07	30·06	62	47	—	—
		11	N	30·15	30·06	65	38	—	
		12	NE	30·15	30·13	62	33	—	
	New M.	13	E	30·14	30·10	68	34	37	
		14	E	30·14	30·12	65	34	—	
		15	E	30·12	30·05	64	36	—	
		16	E	30·00	29·98	66	43	—	
		17	E	30·01	29·95	68	37	—	
		18	SE	30·05	30·01	71	39	—	
		19	SE	30·02	29·97	72	44	—	
		20	SW	29·97	29·76	75	52	—	—
	1st Q.	21	SW	29·76	29·70	68	44	56	16
		22	SW	29·79	29·75	65	40	—	1
		23	S	29·75	29·59	65	48	—	—
		24	S	29·57	29·52	70	60	—	—
		25	SW	29·77	29·74	70	44	—	35
		26	SE	29·74	29·65	66	55	—	—
		27	W	29·76	29·75	66	48	—	31
		28	N	29·97	29·76	64	44	25	—
	Full M.	29	N	29·97	29·94	61	54	—	—
		30	NE	30·00	29·94	64	46	—	
10th Mo.		Oct. 1	NE	30·06	30·00	54	40	—	
		2	NE	30·16	30·06	54	37	—	
		3	NE	30·20	30·16	57	37	—	
		4	NE	30·20	30·03	60	39	—	
		5	NE	30·03	29·79	59	31	43	
				30·20	29·52	75	31	1·61	1·20

NOTES.—Ninth Mo. 7. Showery: wind veered to NW: in the evening *Nimbi*, with large *Cumuli:* rain in the night. 8. Overcast, windy: calm evening. 9. Cloudy: a few drops. 10. Windy, with *Cumulus* and *Cirrostratus:* a slight shower at 8 p.m. 11. Windy: fair day: *Cumulus* with *Cirrostratus*, densely grouped at sunset. 12. Much dew: orange sky at sunset: from 11 to 15 inclusive, hoar frost in the mornings, and the *Stratus* by night. 16. Brisk wind: calm at night. 17. A very wet mist this morning: the day was fine, with large *Cirri*. 18. Fine: a group of *Cirri* obscured the setting sun. 19. Misty morning: clear day. 20. *Cirrus* in streaks from N to S, mixed with haze lowering and passing to *Cirrocumulus* and *Cirrostratus*, the motion being from E to W: a shower of rain followed these appearances. 21. Brisk wind: changeable sky. 22. Dew this morning: the sky overcast with *Cirrostratus* and haze: p. m. windy, with a shower. 23. Misty a. m. with *Cirrostratus:* showers, with wind followed. 24. Blustering at S a. m.: temperature at the maximum at nine. Cloudy, damp, and close. In the evening pretty much lightning to the S and W: at nine the storm came hastily over us, giving a few discharges of blue lightning, with thunder and heavy rain. 25. A small steady rain, succeeded by calm sunshine. 26. Dew a. m.: afterwards cloudy and windy, with showers. 27. Cloudy a. m.: a *Stratus* at night. 28. Overcast: a slight shower, succeeded by *Stratus*. 29. Windy: overcast: a few drops. 30. Windy.

Tenth Mo. 1—5 inclusive. Clear weather, with brisk drying winds.

RESULTS.

Winds Variable: the SW uniformly brought rain; the opposite current, fair weather.

Barometer:	Greatest height	30·20 in.
	Least	29·52 in.
	Mean of the period	29·945 in.
Thermometer:	Greatest height	75°
	Least	31°
	Mean of the period	53·79°
Evaporation		1·61 in.
Rain		1·20 in.

TABLE XCIX.

	1814.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
10th Mo.	L. Q.	Oct.	6	SW	29·73	29·63	59°	39°	—	10
			7	NW	29·83	29·73	57	32	—	—
			8	N	30·01	29·83	55	31	—	
			9	NW	30·16	30·01	52	24	—	
			10	N	30·16	29·91	56	34	—	
			11	S	29·91	29·68	54	41	—	
			12	SW	29·68	29·57	59	44	—	—
	New M.		13	SE	29·57	29·40	64	50	32	1
			14	SW	29·49	29·31	67	48	—	13
			15	SW	29·48	29·40	59	42	—	10
			16	SW	29·68	29·48	56	38	—	—
			17	S	29·68	29·28	58	43	—	—
			18	SE	29·40	29·13	58	36	—	14
			19	SW	29·25	29·03	54	42	—	80
			20	W	29·68	29·25	55	30	—	—
	1st Q.		21	W	29·73	29·68	55	33	30	
			22	SW	29·55	29·50	59	47	—	4
			23	NW	29·74	29·54	57	34	—	
			24	S	29·74	29·09	53	39	—	95
			25	NW	29·50	29·09	52	32	—	6
			26	NE	29·70	29·50	50	38	—	—
			27	W	29·81	29·70	53	32	—	
	Full M.		28	NE	29·82	29·75	52	32	17	
			29	SE	29·84	29·66	52	37	—	13
			30	Var.	29·90	29·87	53	39	—	
			31	NE	29·93	29·87	55	47	—	
11th Mo.		Nov.	1	NE	29·96	29·93	50	43	—	4
			2	NE	29·96	29·93	44	38	—	
			3	NE	29·93	29·83	47	33	10	
					30·16	29·03	67	24	89	2·50

NOTES.—Tenth Mo. 6. Misty morning: the trees dripping: the wind veered from NW to SW, with *Cirrostratus*, then *Cumulostratus*, and finally rain. 7. Clear a. m.: much dew p. m.: a sudden shower, with hail. 8. Hoar frost: fine day, with *Cumulostratus*. 9. Hoar frost: *Cumulus:* fine day: the wind a strong breeze: clear orange sky in the twilight. 10. Hoar frost: clear: the temperature of last night was destructive to various tender garden plants, and brought down the leaves from the mulberry trees. 11. Wind S a. m.: the sky turbid, and streaked from N to S. 12. Overcast with *Cirrostratus:* it appears to have rained in the night. 13. a. m. Large *nimbiform*

Notes, &c. *(continued)*.

Cirri, passing to *Cirrocumuli*: the wind E, very gentle, the vane remaining at SW: a smart breeze from this quarter ensued. 14. The lighter modifications of cloud, with much wind, a. m.: driving showers p. m. 15. Fine a. m.: then wind and some showers. 16. Clear: windy. 17. The sky veiled with *Cirrostratus*. 18. Much wind: small rain at intervals: then showers. 19. Windy: wet a. m.: clear at noon: p. m. rain again, by inosculation of the clouds: rainbow: wet, stormy evening. 20. Rather windy a. m., with *Cirrostratus* and *Cumulus*: large *Cirri* and *Cirrocumuli* above the wind: a few drops of rain. 21. Hoar frost: calm. 22. Overcast: wind, followed by rain in the night. 23. *Nimbi* to N and S p. m.: a rainbow in the former. 24. A fine day: *Cumulus*, with *Cumulostratus*, and extensive beds of the lighter clouds above, which appeared to descend, passing to the westward: the evening was overcast, and there followed a tempestuous night: the wind was mostly S or SE, changing in the morning to SW. The barometer had been lower than the minimum here noted. 25. Showers a. m.: cloudy p. m.: clear night. 26. Hoar frost: somewhat misty: a little rain followed. 27. A fine day, after a cloudy morning: large distinct *Cumulostrati*, in an air nearly calm. 28. Misty morning: minimum temperature about seven: the drops of dew frozen: a fine day. 29. *Cirrostratus*, overcast sky, a. m.: showery, with wind, p. m. 30. The lighter modifications appeared till noon, in elevated lines stretching NE and SW, the wind being NW.

Eleventh Mo. 1. Cloudy: a steady breeze from NE, and small rain. 2. The breeze continues. 3. The same: overcast morning: fine day.

RESULTS.

Wind for the most part Westerly: but during the latter part of the period Easterly.

Barometer:	Greatest height	30·16 in.
	Least	29·03 in.
	Mean of the period	29·662 in.
Thermometer:	Greatest height	67°
	Least	24°
	Mean of the period	46·43°
Evaporation		0·89 in.
Rain		2·50 in.

Kingston, Jamaica, *October* 27.—On the 17th instant came on dark gloomy weather, with heavy rain. On the 18th it blew *from the N and NW*, one of the most tremendous gales of wind, attended with torrents of rain (which lasted three days), that has been experienced here these 25 years.—(Pub. Ledger).

TABLE C.

	1814.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
11th Mo.	L. Q.	Nov. 4	NE	29·83	29·74	44°	33°	—	—
		5	NE	29·80	29·71	42	32	—	45
		6	N	29·84	29·77	47	30	—	
		7	SW	29·77	29·32	49	31	—	1
		8	SW	29·37	29·23	46	32	—	9
		9	NW	29·89	29·37	42	29	—	
		10	NW	30·28	29·89	40	26	—	
		11	SW	30·28	29·78	47	31	18	
	New M.	12	SW	29·85	29·78	52	38	—	8
		13	NW	29·86	29·80	49	39	—	—
		14	SW	29·85	29·75	53	43	—	—
		15	SW	29·78	29·28	54	45	—	—
		16	W	30·00	29·28	49	32	—	18
		17	SW	30·00	29·82	53	35	—	
		18	SW	29·82	29·37	52	42	—	17
		19	NW	29·48	29·37	47	28	22	
	1st Q.	20	NE	29·57	29·48	43	34	—	20
		21	N	29·69	29·57	38	20	—	
		22	NW	29·67	29·65	36	19	—	
		23	NW	29·81	29·67	35	26	—	
		24	Var.	29·81	29·48	46	35	—	16
		25	S	29·48	29·18	50	42	—	32
		26	W	29·59	29·18	50	32	5	7
	Full M.	27	Var.	29·68	29·30	44	35	—	68
		28	SW	29·64	29·44	45	36	—	27
		29	W	29·44	29·15	48	34	—	
		30	N	29·45	29·12	44	32	—	
12th Mo.		Dec. 1	NW	29·73	29·45	43	30	—	—
		2	W	29·86	29·73	38	30	—	3
		3	E	29·86	29·50	38	28	6	32
				30·28	29·12	54	19	0·51	3·03

NOTES.—Eleventh Mo. 4. Misty morning: cloudy: shower at night. 5. Overcast a. m.: wet afternoon and evening. 6. The drops of dew were frozen, but so clear as not to appear like hoar frost: a fine day, with large *Cirri*, and afterwards *Cirrostratus* and *Cumulus:* a streaked orange sky at sunset. 7. Hoar frost, followed by cloudy sky: some rain after dark. 8. Clear morning: hoar frost: about 4 p. m. the sky became very dark, and there was a storm of rain, attended by a single loud explosion of electricity. It is remarkable that on the same day of the month last year, at the same hour, and in the same direction (SW), we had a similar storm. 9. *Cirrus*, with the compound modifications: several shooting stars this evening: windy afterwards. 10. A steady breeze from the NW: *Cirrostratus* appeared over the Thames at sunrise: ice a quarter of an inch thick, and permanent: a brilliant twilight; first, lemon colour surmounted by purple; then, by the blending of the two, a rich deep orange. 11. Hoar frost. I observe this often continues an hour longer on some tufts of *saxifraga cæspitosa* than any where else in my garden: the plant grows on close spongy masses of fibre, which are bad conductors of heat. 12. It was stormy last night; and is said to have thundered and lightened about 3 a. m. Wet this morning; but the day fine: twilight orange, delicately varied with dusky horizontal striæ. 13. Cloudy and raining at 8 a. m., but fine afterwards, with a smart breeze. 14. Cloudy. 15. *Cirrostratus* a. m.: then *Cirrus nimbiformis*, depending and curling beneath: a turbid sky ensued, and wind in the night. 16. A wet stormy morning. 17. Much wind by night. 18. Small rain a. m.: wet and stormy at night. 20. Hoar frost: a little rain at intervals. 21. Overcast. 22, 23. Hoar frost: misty. 24. The same: near sunset a hollow wind from SW, and rain in the night. 25. Wet day. 26. Some rain a. m. 27. Clear morning, with evaporation: but before noon cloudiness was coming on from the W, and it rained steadily from sunset till late at night. 28. Wet again in the night. 30. Large elevated *Cirri*, with *Cirrostratus.*

Twelfth Mo. 1. Brisk wind at N: in the night a slight sprinkling of snow. 3. Wet morning.

RESULTS.

Prevailing Winds Westerly.

Barometer:	Greatest height	30·28 in.
	Least	29·12 in.
	Mean of the period	29·635 in.
Thermometer:	Greatest height	54°
	Least	19°
	Mean of the period	39·05°
Evaporation		0·51 in.
Rain		3·03 in.

On the 6th of November, about six in the morning, two violent shocks of an earthquake were felt at *Lyons*, in the direction from west to east, preceded by a loud clap of thunder, unaccompanied by lightning. Both before and after the report the rain descended in torrents; the weather had been the night preceding very tempestuous.—(PUB. LEDGER).

There was a considerable fall of snow at Edinburgh on the 9th, a circumstance rather unusual so early in the season. At the beginning of last week a great deal of snow also fell on the NW of Devon, some of the hills were covered, and on Dartmoor, several inches deep.—(PUB. LEDGER, *November* 17).

TABLE CI.

	1814.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
12th Mo.	L. Q.	Dec. 4		29·50	29·34	44°	36°	—	
		5		29·94	29·50	41	33	—	
		6		30·04	29·91	38	28	—	
		7		30·04	29·60	45	33	—	—
		8	S	29·60	29·25	52	45	—	44
		9	SW	29·70	29·25	52	25	—	6
		10		29·37	29·35	51	29	11	53
	New M.	11	W	29·63	29·37	54	48	—	33
		12	SW	29·65	29·50	56	53	—	17
		13		29·72	29·50	56	41	—	3
		14	SW	29·56	29·54	53	42	—	7
		15	SW	29·68	29·40	55	43	—	3
		16	SW	29·92	29·40	55	37	—	10
		17	SW	29·78	29·68	55	44	—	5
		18	SW	29·82	29·67	56	51	33	2
	1st Q.	19	SW	30·05	29·67	55	30	—	11
		20	N	30·08	29·98	38	28	—	
		21	NE	29·98	29·73	39	31	—	
		22	E	29·73	29·46	37	32	—	
		23	E	29·69	29·67	38	32	—	
		24	E	29·67	29·62	33	29	—	—
		25	NE	29·61	29·58	33	30	20	—
	Full M.	26	NE	29·62	29·45	35	32	—	16
		27	SE	29·45	28·94	41	35	—	1·14
		28	NE	29·70	28·94	40	33	—	—
		29	SE	29·78	29·70	43	34	—	2
		30	S	29·90	29·71	49	33	—	9
1815.		31	E	30·18	29·90	44	31	—	—
1st Mo.		Jan. 1	N	30·43	30·18	42	30	4	
				30·43	28·94	56	25	0·68	3·35

Notes.—Twelfth Mo. 4—6. Slight hoar frosts: ice on the ponds: windy at intervals. 7. Occasional small rain. 8. The maximum temperature of the last 24 hours this morning, with a hollow SW wind: an unsteady rain followed, of many hours' continuance, with much wind at S. 9. Windy: the barometer appears to have stood through the night at the minimum noted. 10. Hoar frost: *Cirrostratus:* overcast a. m.: after one, the day wet and stormy: much wind in the night. 11. Cloudy: rain before nine, and at intervals through the day. Though it was very cloudy, the bees came out in great numbers, as observed about the same time last year. 12. Temperature this morning 54°, with low driving clouds, and a gale at SW. 13. Early this morning the wind was violent: it moderated about 3 p. m.: and the clouds, after a squall, assumed the *Cumulostratus:* much water out in the marshes. 14. Red sunrise: *Cirri* over the sky, with their extremities drawn out westward: p. m. it blew hard again from SW, followed by rain at night. 15. Much wind and cloud a. m. The millers, who are said to have remarked that for two years past our atmosphere has been calmer than usual, will now probably complain of an excess of wind. The *Cumulostratus* appeared after 3 p. m., and the evening and night were calm. 16. Early this morning the wind rose again, and blew with great violence, with rain at intervals, till about 3 p. m., when the same change ensued as yesterday. 17. Overcast: windy: some rain p. m.: a gale through the night. 18. The tempestuous weather continues. 19. A shower about 8 a. m., and again in the evening, after which light clouds were observed to pass the moon's disk with less and less velocity. 20. Hoar frost: a fine and nearly calm day: swarms of gnats in the air, and *gossamer* floating: the dew froze on the grass by half past 4 p. m.: there was a corona round the moon, and a *Stratus* at night. 21. Hoar frost. 22. Dry air: steady breeze: *Cirrus*, passing to *Cirrostratus:* a lunar halo of large diameter. 23, 24. Cloudy: steady breeze. 25. Some snow in the night, followed by a little more in the day. 26. Snow more plentiful a. m.: a thaw. 27. Rain: sleet and snow: rain again. 28. The maximum temperature early this morning: much rain. 29. Overcast sky. 30. Misty. 31. Hoar frost: large *Cirrus* clouds: a few drops of rain: p. m. *Nimbus.*

1815. First Mo. 1. Hoar frost: a rose-coloured sky, with *Cirrostratus* at sunset.

RESULTS.

Winds in the fore part Westerly and violent: in the latter, Easterly and moderate: in both attended with rain: but one clear day in the period.

Barometer:	Greatest height	30·43 in.
	Least	28·94 in.
	Mean of the period	29·665 in.
Thermometer:	Greatest height	56°
	Least	25°
	Mean of the period	40·13°
Evaporation		0·68 in.
Rain		3·35 in.

STORMS OF WIND.

NEWCASTLE, *December* 23.—The late hurricane, which commenced in this neighbourhood on Friday morning (December 16), has been generally felt throughout the whole country. In the south, the storm commenced on the 11th instant, and the shipping on the SW coast has suffered most dreadfully from its effects. The gale from that time *has moved gradually northwards*, and has left sufficient evidence of its violence in all the places within its vortex.

WHITEHAVEN.—The night of December 15 was very tempestuous. Numbers of chimneys in this town were blown down; several houses suffered greatly in their roofs, and some were nearly unroofed.

At Lancaster the tide began to flow about two hours earlier than set down in the tide table; and the coach from Ulverston, crossing the Lancaster Sands, was obliged to make for the shore above Silverdale. The tide continued to flow about half an hour later, and was between six and seven feet higher than mentioned in the table.

The Hull Paper says, the gale, or rather hurricane, of December 10, was the longest and most severe that has been experienced on this coast for many years. The Humber for twelve hours was covered with white spray; the waves washed over all the vessels at anchor, and many of them were forced from their anchorage.

GREENOCK, *December* 16, half-past 3 p.m.—Since our last, the wind continued blowing strong from the S and SW. Last night it greatly increased, and until now has continued to blow with unremitting violence. In the morning there was a considerable deal of thunder and lightning, accompanied by excessive falls of rain.

LIMERICK, *December* 17.—Within the memory of the oldest inhabitant of this city there has not been so tremendous a hurricane as was experienced here yesterday morning; it commenced with the wind at WSW, about three o'clock in the morning, being then about low water, raising the tide (the spring tides falling off) to an height never before known in this port.

A Portsmouth Paper of December 18, says—"A very strong gale of wind, from the W and SW, has prevailed here nearly the whole of the present week; in consequence of which, we are sorry to state, some lives have been lost, and much anxiety occasioned. The gale attained its utmost fury on Wednesday (December 14): during the greater part of that day it was found impracticable to proceed to Spithead from the port.

WEYMOUTH, *December* 23.—This week we have experienced one of the most tremendous gales of wind at SE ever known at this port.

FALMOUTH, *December* 28.—Put back the Duke of Kent packet, which sailed from this port, with mails for Lisbon, on the 5th instant, having experienced very heavy gales of wind, in one of which, on the 21st, they were under the necessity of cutting away their mainmast (then in lat. 44½ long. 11½).

LIVERPOOL, *February* 8, 1815.—We this day learn, that the Star, Disbrow, from New Brunswick for this port, met with a severe gale on the 21st of December, in lat. 40 long. 20, in which her dead lights were stove in, bulwarks carried away, a passenger and four seamen washed overboard; the captain and one man died on the wreck; and the mate and five of the crew were taken from the foretop, by a Portuguese schooner, where they had been seven days.

NOTES, &c. *(continued)*.

The late tempestuous weather has been succeeded, in the neighbourhood of Bristol, by a heavy fall of snow, which covers the country in that part to the depth of three inches, and continued on Thursday (December 22), without any appearance of a change. Fortunately there was not any wind, and the snow had not drifted.

No place in the empire has suffered so much from the late storm as Adare, the beautiful seat of the Hon. W. Quin, in the county of Limerick. It has lost about 700 trees, of which above 500 were full grown timber, of very great size, and ornamental to the grounds, torn up by the roots.—(PAPERS).

LARGE HAIL AND HOT WIND IN NORTH AMERICA.

Extract of a Letter dated Cincinnati, November 9, 1814, *from Dr. N. Crookshank to Dr. Peter Wilson, Columbia College.*

On the 4th of June last, about meridian, a dark cloud appeared in or near the SW point of the horizon, having the usual appearances of electricity, as was known, by the hemispherical or convex appearances of various parts on the superior sides of the different shelves composing it; while the the lower part appeared parallel to the earth. Some light clouds were seen to move with great rapidity from the NE, and appeared to meet the former; when both seemed to rise perpendicularly several degrees, so as to attain an extraordinary height. I then predicted hail, which presently fell, of uncommon size. Several stones were picked up after the shower [which ended in rain], too large to put into a cup four inches in diameter. Others were picked up in the time of the fall, thirteen, fourteen, and even fifteen, inches in circumference: yet, strange to tell, no material damage was done, though the width of the shower was five miles, and twenty or thirty in length; the tract of the largest hail, in centre of the former, about a mile. The larger pieces appeared to be aggregated of numerous others, which were likewise composed of smaller ones. Some, however, of more than ordinary size, appeared single, as if they had been snow balls immersed in water, and re-frozen. The largest of those I saw resembled the section of a large hen's egg. About five the same afternoon, a hot or very warm current of air passed over, of such temperature and composition, as to threaten those who breathed it with instant death. Their only remedy was by stooping down near the earth. It actually did prove fatal to the leaves, and parts of leaves of many vegetables, by which means its traces were discovered above sixty miles, along and near the Ohio river.

This current of hot air happened entirely out of the tract of the hail, to the southward and eastward of it.

(From a Paper on Meteorology, read before the Literary and Philosophical Society of New York, December 8, 1814. By JOHN GRISCOM).

TABLE CII.

	1815.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
1st Mo.	L. Q.	Jan.	2	NE	30·45	30·42	35°	32°	—	
			3	NE	30·42	30·16	33	30	—	
			4	N	30·16	30·06	33	30	—	
			5	NE	30·06	30·05	31	30	—	
			6	N	30·05	29·95	34	25	—	
			7	NW	29·95	29·48	35	24	—	
			8	W	29·99	29·48	34	25	—	
			9	Var.	30·02	29·76	42	26	—	
	New M.		10	NW	29·76	29·52	44	35	13	
			11	NW	29·88	29·52	40	32	—	
			12	NW	30·15	29·88	40	24	—	
			13	SW	30·15	29·75	40	28	—	28
			14	N	30·17	29·75	43	32	—	
			15	NE	30·30	30·17	36	27	—	
			16	Var.	30·25	30·20	37	30	—	
			17	NW	30·25	30·13	41	32	19	
	1st Q.		18	N	30·13	29·96	36	27	—	
			19	E	29·96	29·68	34	22	—	
			20	NE	29·80	29·77	28	26	—	
			21	NE	29·80	29·75	35	29	—	
			22	N	29·85	29·80	35	28	—	
			23	Var.	29·85	29·73	37	17	—	
			24	Var.	29·61	29·56	29	20	—	
	Full M.		25	N	29·56	29·41	30	22	—	
			26	SE	29·41	28·96	39	23	—	
			27	E	28·96	28·88	39	30	—	
			28	SW	29·03	28·95	42	36	—	57
			29	Var.	29·24	29·03	43	34	—	
			30	SE	29·29	29·22	41	35	—	
			31	S	29·96	29·34	45	38	17	22
					30·45	28·88	45	17	49	1·07

NOTES.—First Mo. 2. Slight hoar frost: misty: cloudy. 3. Breeze fresh, and drier air: slightly clouded. 4. The same. 5. The same: a little snow. 6. The same. 7. A bank of *Cirrostratus* in the SE a. m.: during the forenoon these clouds passed over in flocks, and becoming denser at night, there fell a little rain or sleet. 8. A fine day, with *Cirrus*: bright starlight night. 9. Clear morning, but a *Cirrostratus* over the marshes, and *Cirrus* above in lines from NE to SW: at midday a little snow: windy evening. 10. *Cirrostratus* and *Cumulostratus*: maximum of temperature for the day this morning. 11. Brisk wind: *Nimbi* to the S, succeeded by *Cumulus* and *Cirrus*:

a little snow after dark. 13. Barometer falling a. m.: hoar frost: red lowering *Cirrus* and *Cirrostratus* clouds, in lines from N to S: these indications were followed by rain after 2 p. m. 15. Cloudy: smart breeze: SE in the night. 16. The sky overcast with *Cirrostratus* a. m.: this modification continued through the day, with a dry air. 17. Cloudy: windy night. 18—23. Snow fell at intervals during these six days, often in regular and beautiful crystallizations. 24. Much rime on the trees and shrubs a. m.: misty from *Cirrostratus:* temperature 18° about nine: wind easterly in the night. 25. Somewhat misty: overcast: snow. 26. Cloudy a. m.: snow p. m. in crystals of all sizes, varying from the simple unison of six prisms in a minute star to broad feathery flakes of the most regular compound structure: it was nearly calm during this time; so that the crystals escaped the derangement consequent on being driven about in their descent. 27. Snow and sleet p. m.: a thaw, interrupted by a little frost in the evening: maximum of temperature in the night. 28. Wind and rain in the night. 30. Misty a. m.: the trees dripping: rain.

RESULTS.

Winds Northerly till near the close of the period.

Barometer:	Greatest height	30·45 in.
	Least	28·88 in.
	Mean of the period	29·77 in.
Thermometer:	Greatest height	45°
	Least	17°
	Mean of the period	32·66°
Evaporation		0·49 in.
Snow and Rain		1·07 in.

THUNDER STORM IN THE NETHERLANDS.

The 11th of January, 1815, was a remarkable day for the whole country from the North Sea to the provinces of the Rhine, on account of a tremendous storm of thunder and lightning, during which the steeples of many churches, in places far distant from one another, were set on fire nearly at the same hour. The tempest took its course over Arnheim, Utrecht, Bois-le-Duc, and several other places. (Details of about a dozen of these buildings damaged or burnt follow). It is remarkable, that only the highest steeples were every where struck, and that this tempest confirmed in a striking manner the accuracy of previous observations, that storms of thunder and lightning, though of rare occurrence in winter, are generally most mischievous in that season.

(GERMAN PAPER).

TABLE CIII.

	1815.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
2d Mo.	L. Q.	Feb. 1		29·45	29·36	48°	39°	—	
		2	E	29·62	29·45	46	36	—	
		3	W	29·62	29·39	49	39	—	13
		4	SW	29·80	29·39	54	36	—	
		5	SE	29·92	29·74	50	38	—	
		6	SW	29·74	29·55	47	42	—	4
		7	Var.	29·70	29·55	52	36	—	—
		8		29·62	29·49	50	38	15	15
	New M.	9	SE	29·66	29·63	47	37	—	
		10		29·63	29·43	46	40	—	4
		11	Var.	29·40	29·28	51	39	—	11
		12	SW	29·51	29·37	50	48	—	21
		13	SW	29·60	29·40	52	32	—	
		14	E	29·65	29·40	50	37	—	—
		15	Var.	29·65	29·56	51	42	—	—
		16	SW	29·56	29·50	54	35	18	16
	1st Q.	17	NW	30·26	29·50	52	33	—	2
		18	SW	30·26	30·16	51	34	—	
		19	SW	30·16	29·71	48	45	—	—
		20	W	29·82	29·55	54	42	—	26
		21	NW	30·15	29·82	56	48	—	
		22		30·20	30·15	57	39	—	
	Full M.	23		30·15	30·00	51	40	27	
		24	W	30·00	29·97	52	47	—	
		25	SW	29·97	29·92	53	46	—	
		26	NW	30·40	29·92	54	29	—	5
		27		30·47	30·44	48	25	—	
		28	SE	30·44	30·15	45	31	—	
3d Mo.		March 1	SE	30·19	30·15	52	33	20	1
				30·47	29·28	57	25	80	1·18

NOTES.—Second Mo. 1, 2. Misty dull weather. 3. Cloudy: wind and rain in the night. 4. Temperature 49° at the time of observation: fine: *Cumulus* beneath hazy *Cirrus*. 5. *Cirrostratus* and haze at sunrise, and much dew, which did not evaporate: a very fine day: temperature 56° in the sun: *Cumulostratus* p. m. 6. The same, followed by rain. 7. Overcast a. m.: dripping: Wind NW p. m.: groups of *Cumulostratus*, *Cumulus*, and *Cirrostratus*, occupying the whole S from one to two, coloured light indigo, with red haze above, and attracting the smoke. 8. The wind rose at S p. m. with the usual hollow sound: a beating rain from that quarter ensued. 9. Misty, from a diffused *Cirrostratus*, and cloudy above. Water from a well, which might be 10° warmer than the air, emitted a visible steam. 10. Cloudy: dripping at intervals. 11. The same: dark *Nimbi* passed in the S, the wind being W p. m. 12. Misty a. m.: cloudy: wind and showers. 13. A wet windy morning, succeeded by a very fine day: *Cumulus*, with *Cirrus*. 14. A very moist *Cirrostratus* a. m.: then fine, with various clouds: a little misty rain at night. 15. Much dew: the rain kept off till evening. 16. Windy: wet: a lunar corona. 17. Morning clear, with dew: then *Cumulus*, which becoming dense inosculated with the clouds above and with the smoke: a little rain p. m.: lunar corona. 18. Slight hoar frost: haze, passing to *Cirrus* and *Cirrostratus*. 19. Heavy *Cumulostrati* through the day: much wind. 20. Windy: wet: lunar halo at night. 21, 22. *Cumulostratus*: windy. 23. Fine. 24. Ramified *Cirrostratus*, indicating wind, which followed. 25. Blustering wind, with *Cumulostratus*, and strong evaporation: a little rain notwithstanding. 26. Showers, which laid the dust: a sudden clearing in the W at sunset. 27. Very white frost: a fine day out of the smoke. 28. Hoar frost, and a frozen mist: a serene day.

Third Mo. 1. Hoar frost: *Cirrus* in a fine elevated veil, passing to *Cirrostratus*, and exhibiting between ten and eleven a solar halo: a very fine day, the pollution of the smoke excepted.

RESULTS.

Winds Variable, but for the most part Southerly.

Barometer:	Greatest height	30·47 in.
	Least	29·28 in.
	Mean of the period	29·785 in.
Thermometer:	Greatest height	57°
	Least	25°
	Mean of the period	44·43°
Evaporation		0·80 in.
Rain		1·18 in.

VOLCANIC ERUPTION.

An American paper contains an account of an eruption of the volcano of *Albay*, on the 1st of February, 1815. This volcanic mountain is situated in the province of Camarihes, on the southern part of the island of Lucon, or Luconia, one of the Phillippine Isles in the Indian Ocean. Five populous towns were entirely destroyed by the eruption; more than 1200 of the inhabitants perished amidst the ruins; and the 20,000 who survived the awful catastrophe were stripped of their possessions, and reduced to beggary.

(PUB. LEDGER).

TABLE CIV.

	1815.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
3d Mo.	L. Q.	March	2	Var.	30·22	30·17	48°	35°	—	8
			3	NW	30·20	30·17	49	37	—	
			4	SW	30·17	30·11	54	41	—	
			5	NW	30·17	30·06	55	40	—	
			6	W	30·17	29·90			—	
			7	SW	29·90	29·35	52	38	—	—
			8	W	29·50	29·35	52	32	—	45
			9	NW	29·46	29·16	49	34	30	15
			10	W	29·32	29·16	48	29	—	6
	New M.		11	SW	29·48	29·32	47	30	—	—
			12	S	29·32	28·86	49	35	—	39
			13	NW	29·52	28·86	53	39	—	10
			14	SW	29·96	29·52	49	32	—	5
			15	Var.	29·96	29·68	55	37	—	19
			16	SW	29·83	29·68	62	43	—	
			17	NW	29·97	29·83	62	42	35	
	1st Q.		18	NW	29·99	29·88	55	46	—	—
			19	NW	29·91	29·88	57	45	—	13
			20	W	29·91	29·75	60	41	—	
			21	SW	29·75	29·54	59	45	—	6
			22	SW	29·54	29·31	61	45	—	6
			23	W	29·42	29·14	59	40	—	15
			24	SW	29·42	29·25	57	40	35	8
			25	SW	29·70	29·25	56	31	—	
	Full M.		26	SW	29·70	29·42	53	46	—	—
			27	SW	29·46	29·34	60	49	—	12
			28	SW	29·95	29·46	60	44	—	26
			29	S	29·93	29·77	62	43	—	
			30	SW	29·93	29·88	59	43	—	
			31	Var.	29·88	29·65	73	46	43	
					30·22	28·86	73	29	1·43	2·33

NOTES.—Third Mo. 2. Small rain at intervals. 3. Misty morning: fine day. 4, 5. *Cumulostratus.* 6. Fine day: *Cirri* appeared, much elevated, and coloured at sunset. 7. Fine morning: cloudy and windy, with some rain p. m.: night very stormy. 8. Windy, wet a. m.: showers by inosculation in the evening. 9. Hoar frost a. m.: turbid sky: rain: fair p. m. 10. Snow early, after which various modifications of cloud, ending in showers of rain and snow p. m. 11. Hoar frost: *Cirrostratus* and *Cumulostratus: Nimbi,* with large hail p. m. 12. Dull misty day: at night very stormy, with rain. 13. Cloudy a. m., with a gale at SW, and rain at intervals: several dense *Nimbi,* thunder, hail, and hard rain p.m.: much wind with distant lightning, at night. 14. *Cirrostratus* and haze: then *Cirri*, passing to dense *Nimbi*: gusts of wind, hail, and rain. 15. The barometer has risen, with an almost uniform motion, about an inch and a quarter in 36 hours; yet the air has not become clear: it should be observed, that there had been much previous depression: a wet forenoon, with a breeze at E: *Cirrostratus* p.m.: at night much wind. 16. High wind at SW, with *Cumulostratus* a.m.: fair and pleasant. 17. Much dew a.m.: *Cirrostratus* with *Cirrocumulus*: the light clouds after sunset beautifully tinted with lake and purple. 18. After a few drops, the *Cumulostratus* prevailed, followed by rain in the night. 19. Some rain a.m.: then *Cumulostratus*: and at evening *Cirrostratus*, with a lunar corona. 20. Dew a.m.: a light veil of *Cirrostratus*: at evening, the clouds passed to the N. 21. *Cumulus*, beneath *Nimbiform Cirrus*, both elevated: about 5 p.m. during the approach of a squall, the wind was very noisy among the branches (now covered with opening buds), producing an almost vocal modulation of sound: as soon as the trees became wet, this was exchanged for the usual hoarse noise, resembling that of the sea shore. The night was boisterous. 22. Much wind: showers: two strata of cloud: borne very high, as for some days past. 23. Heavy squalls, with some hail in the showers: a singular combination of clouds in the E, p.m.: it was a *Nimbus*, with *Cumuli* adhering and entering at the flanks, while a very lofty columnar *Cumulus* shot up through the midst of the crown, and this again was capped with a small *Cirrostratus*. 24. Various clouds: squally p.m. 25. The same: a brisk evaporation: at sunset *Cumulus* at a considerable height inosculated with *Cirrus* above, after which two distinct *Nimbi* in the S, which went away eastward. 26. Driving showers: at evening a lunar corona, followed by much wind and rain at intervals. 27. Stormy: showers. 28. Fair. 29. Large *Cirri*, which passed chiefly to the *Cirrocumulus* p.m. 30. Misty a.m.: overcast p.m.: little wind. 31. A very fine day: large *Cirri* formed alone at a considerable elevation, and passed in the evening to the NW: much dew followed.

RESULTS.

Winds Westerly.

Barometer:	Greatest height	30·22 in.
	Least	28·86 in.
	Mean of the period	29·672 in.
Thermometer:	Greatest height	73°
	Least	29°
	Mean of the period	47·44°
Evaporation		1·43 in.
Rain		2·33 in.

TABLE CV.

	1815.			Wind.	Pressure.		Temp.		Evap.	Rain, &c.
					Max.	Min.	Max.	Min.		
4th Mo.	L. Q.	April	1	SE	29·72	29·55	70°	45°	—	3
			2	W	29·82	29·81	63	42	—	
			3	Var.	29·91	29·81	57	34	—	3
			4	W	30·18	29·91	60	35	—	
			5	W	30·20	30·12	59	41	—	
			6	NW	30·12	30·06	66	43	—	
			7	E	30·06	29·91	69	45	—	
			8	E	29·91	29·81	61	45	68	
	New M.		9	NE	29·84	29·81	64	43	—	—
			10	NE	29·90	29·84	54	50	—	50
			11	Var.	29·90	29·89	63	47	—	—
			12	SW	29·89	29·75	68	40	—	4
			13	Var.	29·59	29·56	69	36	—	23
			14	NW	30·00	29·59	46	34	—	—
			15	N	30·13	30·00	50	28	30	
	1st Q.		16	NE	30·13	30·11	53	30	—	
			17	NE	30·25	30·11	54	31	—	
			18	N	30·25	30·18	54	30	—	—
			19	Var.	30·18	29·85	59	38	—	
			20	SW	29·85	29·17	59	36	—	—
			21	Var.	29·17	28·74	49	40	—	72
			22	N	29·06	28·74	50	40	38	20
	Full M.		23	NW	29·24	29·06	52	35	—	16
			24	NE	29·66	29·24	54	36	—	2
			25	Var.	29·91	29·66	63	41	—	8
			26	SE	30·06	30·04	58	33	—	—
			27	NE	30·04	29·92	61	43	—	1
			28	NE	29·92	29·64	64	45	—	
			29	NE	29·64	29·49	54	39	—	—
			30	SE	29·65	29·47	56	40	45	7
					30·25	28·74	70	28	1·81	2·09

Notes.—Fourth Mo. 1. A summer-like day, with a breeze of wind: *Cirrus* formed about noon, and continued after sunset, passing to *Cirrostratus:* some rain followed. 2. Overcast a. m., apparently with *Cirrostratus* from *Cirrus:* during the middle of the day this gave place to *Cumulostratus.* 3. Overcast, calm, with dew on the grass a. m.: showers followed: after which *Cumulus* and *Cirrus.* 4. Much dew: *Cirrus,* followed by *Cirrostratus:* a few large drops about sunset. 5. Much dew: *Cirrus.* 6. The same: low *Cumuli* prevailed afterwards, some of them capped with *Cirrostrati:* then a shallow bed of *Cumulostratus,* ending at sunset in *Cirrostratus:* the evening twilight opake, dewy, and suffused with red. 8. *Cumulus* beneath

Notes, &c. *(continued).*

Cirrocumulus: a strong breeze: a mixture of *Cirrostratus* and *Cirrus* gave the clouds an appearance of active electricity; but the whole ended in *Cirrostratus.* 9. A confused mixture of the modifications, as yesterday, with the addition of haze: some drops by 10 a.m., and a shower p.m. 10. Heavy showers a.m.: cloudy p.m. 11. Wind SW a.m.: the clouds mingled with the smoke of the city, came back from the E at sunset. 12. a.m. The clouds gathered pêle mêle, the *Cumulus* being capped with *Cirrostratus:* p.m. the *Nimbus* appeared, and after some distant thunder to SW we had a shower. 13. *Cirrus, Cirrocumulus* a.m.: much dew, the large drops of which sparkled in the sun with the prismatic colours: various modifications of cloud followed: about 1 p.m. it thundered N: then nearer, with lightning, S: the wind shifting to that point, we had a heavy shower from W, with hail: wind and rain at night. 14. Cloudy, windy, a.m.: *Cumulostratus:* a little snow: swallows skimming the meadows. 15. *Cumulus,* succeeded by *Cumulostratus:* the wind moderate. 16. The same: there were traces of hoar frost this morning. 17. Hoar frost: *Cumulostratus:* at night *Cirrostratus,* and a lunar corona. 18. a.m. A few drops during the union of some clouds, which became *Cumulostratus.* 19. Loose *Cumulus* a.m.: at night *Cirrus,* and afterwards a very large *white* lunar halo. 20. Overcast, dripping: a hail shower p.m.: at night a lunar halo, very small, the prismatic ring touching a corona within. 21. Much cloud and wind: wet forenoon and night: the greatest depression of the barometer that has occurred in the present year. 22, 23. Much cloud, windy: rain at intervals. 24. Windy: cloudy: rain a.m., with a little hail: in the evening *Cumuli* dispersed rapidly, with *Nimbi* and *Cirrostrati* in the horizon. 25. Various clouds, ending in rain, of which, however, very little till night. 26, 27. Windy, variable: some dripping. 28. A little rain early: then *Cumulostratus.* 29. *Cumulostratus:* strong breeze: dripping: the *Cirrocumulus* appeared, transiently, as for several days past: a *Stratus* at night. 30. *Cirrocumulus,* which passed to *Cirrostratus:* p.m. (upon the wind becoming SE) rain.

RESULTS.

Winds Variable, but for the most part Northerly.

Barometer:	Greatest height	30·25 in.
	Least	28·74 in.
	Mean of the period	29·783 in.
Thermometer:	Greatest height	70°
	Least	28°
	Mean of the period	48·56°
Evaporation		1·81 in.
Rain		2·09 in.

TABLE CVI.

	1815.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
5th Mo.	L. Q.	May 1	E	29·67	29·65	67°	50°	—	—
		2	SE	29·72	29·70	71	47	—	13
		3	NE	29·70	29·68	73	47	—	
		4	NE	29·67	29·65	67	44	—	3
		5		29·69	29·65	67	48	—	4
		6	S	29·70	29·66	68	49	—	2
		7	S	29·70	29·67	69	49	—	5
		8	SW	29·81	29·67	70	47	61	
	New M.	9	W	29·80	29·79	69	49	—	5
		10	SW	29·85	29·79	70	51	—	
		11	SW	29·79	29·51	73	51	—	5
		12	SW	29·66	29·64	67	47	—	4
		13	SW	29·65	29·55	67	43	—	19
		14	SW	29·81	29·77	66	45	—	6
		15	S	29·90	29·72	69	41	—	13
	1st Q.	16	Var.	30·23	29·90	70	40	52	
		17	W	30·23	30·19	71	56	—	
		18	NW	30·19	30·10	76	50	—	
		19	W	30·10	29·78	77	48	—	
		20	NW	29·78	29·51	76	43	—	
		21	NW	29·77	29·51	65	42	—	2
		22	W	29·88	29·85	61	34	45	
		23	SW	29·85	29·67	61	44	—	20
	Full M.	24	SW	29·97	29·72	66	48	—	—
		25	NW	30·12	29·97	71	51	—	
		26	NW	30·12	30·10	80	47	—	
		27	NE	30·10	29·89	73	52	—	
		28	NE	29·89	29·80	78	58	—	—
		29	Var.	29·85	29·80	69	50	—	9
		30	Var.	29·90	29·85	68	49	50	
				30·23	29·51	80	34	2·08	1·10

NOTES.—Fifth Mo. 1. Dew this morning: a very fine day: lightning at night far in the S. 2. Dew, with rudiments of thunder clouds, which in increasing became very beautiful: a storm was within hearing the whole midday, to S and SW: p.m. a heavy shower mixed with large hail, followed by lightning in the SE. 3. A strong breeze: thunder clouds, which dispersed in the evening. 4. *Cumulostratus*: some showers, followed by *Cirrostratus*. 5. Much dew: clear morning, succeeded by *Cumulus*, &c.: thunder to the S: a shower in the evening. 6. Dew in large drops: somewhat misty and overcast: a shower in the night. 7. Windy: dripping at eve. 9. *Cumulostratus*:

a few drops by inosculation at sunset: rain in the night. 10. Windy: driving clouds. 11. Dew: windy, a. m. at SE, with large *Cirri,* and below them *Cirrocumulus,* variable and beautiful: p. m. the *Cumulus* was added, with *Cirrostratus* in the region of its base: at sunset a storm in SW, which about nine passed us to NE: the lightning in violet coloured sheets, with delicate white branched streaks on them: the thunder moderate, rolling out to a great length. 12. Much wind: slight showers a. m.: clouds and haze at sunset. 13. wind and rain: at half-past 6 p. m., during a heavy shower which passed to the E, there was a perfect double rainbow, on which I repeated an observation already recorded in this register, under Fifth Month, 4, 1813. The contrast between the space which separated the two bows, and the remainder of the cloud, was on the present occasion very striking. 14. Fair and warm: a shower p. m., with a bow: *Cirrostratus.* 15. Hollow wind at S, with an overcast sky: wet evening. 16. *Cumulostratus:* wind p. m. NW, a milky luminous twilight: much dew. 17. Somewhat misty morning: p. m. *Cirrostrati* advancing from the N overspread the sky, without any other cloud. 18. Windy at N, and overcast with *Cumulostratus,* a. m.: clear and calm p. m.: red sunset. 19. A very fine day: the twilight luminous, and somewhat ruby-coloured, followed by *Cirrostratus.* 20. Windy: various clouds: the sky purplish round the moon at night. 21. Brisk NW wind a. m.: showers. 23. Showers. 28. A brisk wind at SE: *Cirrus,* followed by *Cirrostratus: Nimbi* in the S at sunset: rain by ten at night. 29. Some thunder: rainy afternoon.

RESULTS.

Winds Westerly, with a small portion of Easterly at the beginning and end of the period.

Barometer:	Greatest height	30·23 in.
	Least	29·51 in.
	Mean of the period	29·812 in.
Thermometer:	Greatest height	80°
	Least	34°
	Mean of the period	58·58°
Evaporation		2·08 in.
Rain		1·10 in.

The thunder storm of the 2d, it appears, was about Croydon. At Addington, three miles from that place, "the water poured in torrents, and rushing into the valley formed a stream of 50 feet wide. It took its way through the village, forced open the doors, and carried away the furniture of the habitations."—(PUB. LEDGER.)

TABLE CVII.

	1815.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min		
5th Mo.	L. Q.	May 31	SW	29·90	29·75	72°	54°	—	—
6th Mo.		June 1	NE	30·03	29·80	70	38	—	
		2	NW	30·03	29·93	72	55	—	22
		3	W	29·93	29·83	69	56	—	2
		4	W	29·83	29·55	73	54	—	
		5	SW	29·55	29·41	71	47	—	
		6	SW	29·46	29·33	68	45	45	28
	New M.	7		29·62	29·33	72	42	—	
		8	SE	29·77	29·62	72	46	—	—
		9	SE	29·78	29·77	73	42	—	
		10	NW	29·78	29·74	72	45	—	
		11	SW	29·73	29·67	76	41	—	1
		12	S	29·67	29·43	68	43	—	—
		13	Var.	29·43	29·21	67	50	50	80
	1st Q.	14	W	29·42	29·21	68	45	—	9
		15	SW	29·79	29·42	70	45	—	—
		16	E	29·79	29·50	80	55	—	23
		17	SW	29·53	29·46	76	54	—	8
		18	SW	29·63	29·55	74	51	—	
		19	S	29·63	29·59	73	55	—	
		20	N	29·68	29·57	74	46	—	
	Full M.	21	SW	29·81	29·68	73	50	48	
		22	NE	29·86	29·81	74	44	—	4
		23	NE	29·96	29·86	71	52	—	
		24	N	29·96	29·86	74	55	—	8
		25	NE	30·01	29·86	67	40	—	
		26							
		27	W	30·08	29·98	75	44	—	
		28	W	30·17	30·08	79	49	30	
				30·17	29·21	80	38	1·73	1·85

NOTES.—Sixth Mo. 4. Cloudy: windy. 5, 6. Windy, with *Cumulostratus* and *Cirrocumulus:* showers. 7. Heavy clouds: and at noon a sound like distant thunder in the NE: towards evening the dense clouds dispersed, leaving *Cirri* at a great elevation, and a most beautiful *Cirrostratus*, grained like wood, in the NW: hygrometer (De Luc's) 30° to 35°. 8. A grey sky, with *Cirrocumulus*, &c. which formed heavy *Cumulostratus*, threatening thunder: but a few drops of rain falling, the whole dispersed, save some *Cirrostratus*. 9. *Cirrocumulus*, with *Cirrostratus:* a fine day: much dew at night. 10. A very fine day: in the course of which the hygrometer went to 24°.

NOTES, &c. *(continued).*

11. a. m. Clouds and wind, followed by a shower p. m. 12. Overcast: hygrometer, at 8 a. m. 62°; at nine 55°: clouds from SE, the wind being NW: a little rain: the evening obscure, with *Cirrus* and *Cirrostratus* hanging very low. 13. Cloudy morning: showers: after which large *Cumuli* capped and followed by *Nimbi:* from one to 2 p. m. heavy rain, the wind going from SE by S to NE, then back to SW: some thunder followed, and a fine afternoon, but the *Cirrostratus* remained at night. 14. Wet morning: hygrometer at eight 72°; at nine 50°: after some showers, a fine afternoon. 15. Hygrometer at nine 55°: showers and wind: fair p. m. 16. Hygrometer at nine 39°: a fine day: *Cirrus:* a corona round the moon. 17. Hygrometer 71°: wet morning, and rain in the night: a slight shower p. m. 18. Hygrometer 52°: rain in the night: rather cloudy. 19. Hygrometer 43°: a pretty fine day. 20. Hygrometer 40°: rather a dull day. 21. Hygrometer 55°: pleasant: not very sunny: about 1 p. m. a clap of thunder, and a few large drops of rain. 22. Hygrometer 49°: a dull cloudy morning: a little rain p. m. 23. Hygrometer 44°: morning cloudy: pretty high wind. 24. Hygrometer 38°: morning very dull: about twelve cleared up, and the sun shone very hot: p. m. cloudy again. 25. Rain in the night: p. m. sunshine at intervals. 26—28. Very fine days: hygrometer 46° to 52°.

RESULTS.

Winds Variable.

Barometer:	Greatest height	30·17 in.
	Least	29·21 in.
	Mean of the period	29·708 in.
Thermometer:	Greatest height	80°
	Least	38°
	Mean of the period	60·10°
Evaporation		1·73 in.
Rain		1·85 in.

The observations from the 16th inclusive to the end were made by my son, during my absence from home.

FIGURES ON THE SUN'S DISK.

There is now on the Sun's disk the most extraordinary configuration of maculæ, or spots, that ever was seen: they present, when viewed through an astronomical, or inverting telescope, the exact resemblance of the figures 28. If viewed through an erect telescope, they will of course appear inverted, but equally distinct—the 2 in particular is perfectly formed.—(PAPERS, *June* 13)

TABLE CVIII.

	1815.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
6th Mo.	L. Q.	June 29	SW	30·17	30·11	77°	46°		
		30	NW	30·11	30·02	77	53		
7th Mo.		July 1	NE	30·03	30·02	75	49		
		2	NE	30·03	29·92	71	49		
		3	W	29·92	29·85	67	46		
		4	N	29·96	29·85	72	42		—
		5	Var.	29·98	29·92	70	52		
	New M.	6	Var.	29·88	29·86	70	50	—	10
		7	NE	30·00	29·88	64	42	—	—
		8	NW	30·00	29·96	69	54	—	1
		9	NW	30·04	30·00	70	52	—	
		10	NW	30·05	30·04	75	51	—	
		11	E	30·05	29·99	75	48	—	
		12	SW	29·99	29·93	79	49	62	
	1st Q.	13	SW	29·97	29·87	77	57	—	—
		14	SW	29·97	29·92	79	61	—	—
		15	SW	29·88	29·85	77	57	—	—
		16	W	29·95	29·84	75	55	—	—
		17	W	29·84	29·70	80	54	—	—
		18	SW	29·70	29·62	75	49	—	—
		19	NW	29·65	29·47	68	52	—	69
		20	NW	29·82	29·65	65	49	70	31
	Full M.	21	NW	30·00	29·97	68	47	—	—
		22	NE	30·00	29·98	68	52	—	
		23	NW	30·04	29·98	68	53	—	6
		24	NW	30·13	30·04	69	56	—	—
		25	NW	30·13	30·13	71	52	—	21
		26	NW	30·18	30·13				—
		27	NW	30·19	30·18	66	42	—	—
		28	NW	30·18	30·17	74	47	68	
				30·19	29·47	80	42	2·00	1·38

NOTES.—Sixth Mo. 29. A very fine day: the western sky in the twilight bright orange near the horizon, with a purple glow above. 30. Cloudy morning: after which sunshine at intervals.

Seventh Mo. 1. Heavy *Cumulostrati* p. m. 2. Windy, cloudy, a. m.: *Cirrus*, passing to *Cirrocumulus*, &c. p. m.: a luminous twilight, the clouds much coloured. 3. Windy a. m., with *Cumulostratus*. 4. Cloudy: a few drops p. m. 5. *Cumulostratus*, formed by *Cirrocumulus*. 6. The wind passed this morning by SE to SW, but settled at NW, with various clouds: rain fell in the night. 7. Wet this morning early, and windy at NE: p. m. fair, with *Cumulostratus*. 8. *Cumulus* a. m., with

NOTES, &c. (*continued*).

Cirrostratus: cloudy evening: some rain by night. 9. *Cumulostratus:* orange twilight. 11. A very fine day: pink-coloured *Cirri* at sunset. 12. Sultry: a.m. *Cumulostratus* by inosculation. About noon, an appearance of distant rain in the NE, which continued till evening: the whole of our own clouds gradually disappeared, with a steady SW breeze. At sunset it was clear, and somewhat orange-coloured to NW, but obscure, with *Cirrostratus*, to NE. 13. Large ill-defined *Cirri*, with nascent *Cumuli*, and afterwards *Cirrocumulus*, at a great height, passed to the NE with a fresh breeze: a little rain fell in the evening. Hygrometer about 40° these three mornings past. 14. Various clouds, threatening rain at intervals, which followed p. m. in quantity scarcely sufficient to lay the dust: windy. 15. *Cumulus* beneath *Cirrostratus* a.m.: windy: some light showers, and a trace of the rainbow at sunset. 16. A slight shower a.m. 17. Various clouds a.m.: a few drops p.m.: at evening a tendency to the rapid formation of *Cirrostratus*, the denser clouds at the same time exhibiting a beautiful gradation of colours: twilight orange. 18. In the morning an extensive sheet of flimsy *Cirrocumulus*, which soon moved away. Hygrometer at 9 a.m. 68°. About 10 p.m. the same kind of cloud: a low murky sky. 19. A steady rain a.m. Hygrometer 70° at 9 p.m. 20. Overcast, with *Cumulostratus:* windy. 21—26. Mostly cloudy: occasional showers. 27, 28. Fine.

RESULTS.

Prevailing Winds Westerly, and these for the most part NW.

Barometer:	Greatest height	30·19 in.
	Least	29·97 in.
	Mean of the period	29·961 in.
Thermometer:	Greatest height	80°
	Least	42°
	Mean of the period	61·36°
Evaporation (in 23 days, from the 6th inclusive)		2 in.
Rain		1·38 in.

HAIL STORMS IN FRANCE.

The department of Dordogne has been most dreadfully ravaged by two hail storms. In some parts angular hailstones, some of which were the size of a hen's egg, in less than ten minutes, covered the ground with a solid mass of ice, to the depth of a foot. Every thing was torn up, cut to pieces, and destroyed. Torrents of water, in the sequel, covered these miserable wrecks with sand, pebbles, and rubbish. The whole country presents a scene of desolation not to be described, and the wretched inhabitants are wandering about in despair, without food, and without shelter.—(PUB. LEDGER, *July* 24.)

TABLE CIX.

	1815.		Wind.	Pressure.		Temp.		Hygr. at 9 a. m.	Rain, &c.
				Max.	Min.	Max.	Min.		
7th Mo.	L. Q.	July 29	W	30·17	30·08	75°	55°		
		30	NE	30·15	30·08	72	54		—
		31	NE	30·24	30·15	63	45		2
8th Mo.		Aug. 1	NW	30·25	30·23	71	50		
		2	NW	30·23	30·19	70	59		
		3	NE	30·19	30·10	75	55		
		4	SW	30·10	29·87	79	55		
	New M.	5	W	29·76	29·75	78	52		—
		6	NW	29·96	29·76	65	46		25
		7	NW	29·97	29·96	69	45		
		8	E	29·99	29·97	71	49		
		9	NE	29·99	29·97	70	50		
		10	SW	29·97	29·66	71	58		
	1st Q.	11	NW	29·44	29·35	69	44		—
		12	NW	29·68	29·44	67	50		22
		13	SW	29·93	29·68	71	49	50	
		14	SW	29·94	29·93	78	59	50	7
		15	SW	29·94	29·64	75	59	50	2
		16	NW	29·77	29·51	78	50	47	35
		17		29·89	29·87	70	50	48	
		18	Var.	29·87	29·60	72	54	49	28
	Full M.	19	W	29·77	29·58	67	45	42	
		20	NW	29·86	29·77	68	47	65	
		21	Var.	29·86	29·70	69	49	49	
		22	Var.	29·70	29·58	75	59	43	—
		23	NW	29·91	29·58	72	58	45	86
		24	SW	30·02	29·99	79	55	52	
		25	SW	29·99	29·89	76	63	58	—
		26	SW	30·00	29·89	75	50	46	16
				30·25	29·35	79	44		2·23

Notes.—Seventh Mo. 29—31. Fine.

Eighth Mo. 1—3. Fine. 4. Very bright starlight. 5. Rainy evening. 6. Showery day: a thunder storm, with hail, about 2 p. m. 11. Windy: *Cumulostrati:* and in the evening *Nimbi,* with a little rain. 12. Much wind, with *Cumulostratus:* thunder and rain from N twice p. m., after which more calm. 13. Fine: much wind, with *Cumulus:* coloured *Cirri,* evening. 14. Cloudy morning: temperature 71° at nine: hygrometer at eight 60°: windy: a smart shower by night. 15. Windy: *Cumulus* capped, and *Cumulostratus:* lunar corona at night, followed by rain. 16. Fair and windy a. m., with clouds.

NOTES, &c. *(continued).*

About 4 p.m. at the precise time of the barometer's turning to rise, came a very heavy shower, with two claps of thunder. 17. Fair: somewhat windy: large *Cumulostrati.* 18. Rain till 9 a.m., after which fair: brilliant sunset and moonlight. 20. *Cumulostratus*, low and stationary. 21. *Cumulus*, with *Cirrus* above, having little motion: p.m. the wind went to NE, and the clouds descended, showing a corona round the moon. 22. Overcast a.m., with thunder clouds, the wind SE: very heavy sudden shower before one: wet p.m. 23. Rain and wind early this morning, with thunder, the wind SE: after which sweeping showers from NW, and much wind by night. 24. Fair, with NW wind, and *Cumulus:* then SW, with *Cirrocumulus.* 25. Fine day: *Cumulus*, with *Cirrus:* strong breeze. 26. A little rain early: heavy showers, evening.

RESULTS.

Winds for the most part Westerly.

Barometer:	Greatest height	30·25 in.
	Least	29·35 in.
	Mean of the period	29·88 in.
Thermometer:	Greatest height	79°
	Least	44°
	Mean of the period	62·13°
	Evaporation (at the Laboratory)	4 in.
	Rain	2·23 in.

WATER SPOUT.

On Tuesday the very singular phenomenon of a water spout was observed at Marsden, near Huddersfield. It appeared to be formed of a dense black cloud, and resembled a very long inverted cone, the lowest part of which seemed nearly to touch the ground; above it the clouds were white and fleecy, forming a striking contrast with it, but they appeared strongly agitated. Our correspondent concludes his description with stating, "that the spout, when completely formed, appeared to be round and smooth, and hollow within, and there appeared a stream of water running down the inside, part of which in its descent passed to the outside, and was carried up again very rapidly, by a spiral motion. The whole duration of this phenomenon was about twenty minutes.—(PUB. LEDGER, *August* 18.)

TABLE CX.

	1815.		Wind.	Pressure. Max.	Pressure. Min.	Temp. Max.	Temp. Min.	Hygr. at 9 a. m.	Rain, &c.
8th Mo.	L. Q.	Aug. 27	S	30·00	29·75	76°	54°		
		28	NW	29·81	29·72	71	50	65	5
		29	SW	29·97	29·81	68	43	55	
		30	SW	29·97	29·97	70	51		
		31	SW	30·05	29·97	72	49	47	
9th Mo.		Sept. 1		30·02	29·98	73	50	56	
		2		29·96	29·86	76	54	65	—
	New M.	3	W	29·96	29·88	72	56	52	—
		4	NW	29·95	29·86	73	40	54	6
		5	NW	29·97	29·95	63	40	51	
		6		30·06	29·97	62	31	48	
		7	NE	30·11	30·06	61	32		
		8	SW	30·11	30·08	65	38		
		9	SW	30·08	30·04	68	36	60	
	1st Q.	10	NW	30·05	30·00	72	47		
		11	NW	30·07	30·00	74	46	59	
		12	SE	30·07	29·92	70	42	55	
		13	S	29·92	29·80	78	39	67	
		14	SE	29·80	29·75	79	45		
		15	SE	29·75	29·67	77	54		
		16	Var.	29·80	29·67	75	47	62	9
		17	SW	30·01	29·80	70	50	65	
	Full M.	18	S	30·05	30·04	74	51	58	
		19	Var.	30·04	29·94	68	43	56	
		20	SE	29·94	29·87	60	34		
		21	S	29·87	29·69				
		22	S	29·69	29·57	71	50	49	11
		23	NW	29·57	29·50	59	38	69	
		24	SW	29·77	29·46	58	37	68	26
		25	SW	29·80	29·75	61	43	72	
				30·11	29·46	79	31	58	57

NOTES.—Eighth Mo. 27. *Cirrus*, passing to *Cirrocumulus* and *Cirrostratus*. 28. Shower early, and again p. m. 29. Lightning in clouds to the E, between three and 4 a. m. with moonlight westward: a fair day, with *Cumulus*. Hygrometer at 7 a. m. 70°. Near 8 p. m. a large meteor was seen to pass from the NE to the N. 30. Much dew: *Cumulostratus* during the day. 31. Gray morning: then heavy *Cumulostratus*: very clear night.

Ninth Mo. 1. Misty morning: *Cumulostratus*, which gave place at night to the *Stratus*. 3. A little fine rain early: various clouds followed, and some drops p. m.: a *Cirrostratus* exhibited the prismatic colours at sunset, and some elevated *Cirri* remained long red after it. 4. *Cumulostratus*, after large *Cirri*: showers at evening: rainbow: brilliant twilight. 5. Strong breeze: in the evening the new moon appeared with a well defined disk, and a pale phosphoric light, becoming afterwards gold coloured. 7. Hoar frost: hygrometer 78° at 7 a. m. 8. After a fine day, nearly calm and cloudless, the smoke settled over the opposite valley, which was soon afterwards filled with a *Stratus*. 10. A veil of light clouds, a. m.: somewhat hazy air, with a smell of electricity. 12. A *Stratus*. 13. Much dew; the evening twilight of late has been generally coloured, and at times streaked with converging shadows, the origin of which could not be traced to clouds intercepting the light. 14. *Cirrus* only, which increased during the day, and mostly disappeared in the night: the extremes of temperature near the ground were 83° and 45°: the hygrometer receded nearly to 22°. 15. Clear a. m.: in the evening *Cirri*, and obscurity to the W: after which *Cirrostratus*, and a very distant flash of lightning in the SW. 16. A little rain a. m.: much more cloud than of late has been usual: a *Nimbus* forming in the SW: in the evening steady rain. 17. Large *Cirrus*, passing to *Cirrocumulus*: at sunset a sheet of compound *Cirrostratus*, while increasing by rapid propagation from NW towards SE, was most beautifully kindled up, for a short time, with flame colour and orange on a purple ground. 18. Fair, with the lighter modifications. 19. Much wind at ENE this morning: hygrometer 40° at half-past 10 a. m. 20. Hoar frost: strong breeze: hygrometer 30° at 3 p. m. 21. *Cirrus*, followed by the intermediate modifications. 22. The sky filled gradually with clouds, both above and below: in the evening they grew black, but the rain came on without any explosion of electricity here. A *fire-balloon*, which I discovered near the SW horizon this evening, appeared to be impelled by different currents in rising, but passed the zenith going at a great rate and elevation towards the E. 23. Cloudy: wind NW: then N: small rain. 24. Early overcast, with *Cirrostratus*: the swallows went off, as it appears, this morning: after a murmuring sound in the wind, usual before southerly showers, we had a drizzling day till evening: the hygrometer did not recede past 68°. 25. A fine day: hygrometer went to 87° in the night.

RESULTS.

Winds light and Variable.

Barometer:	Greatest height	30·11 in.
	Least	29·46 in.
	Mean of the period	29·892 in.
Thermometer:	Greatest height	79°
	Least	31°
	Mean of the period	57·00°
Mean of the hygrometer		58°
Evaporation (at the Laboratory)		3·65 in.
Rain		0·57 in.

EXTREMES OF WET AND DRY.

The great drought which for so long a time prevailed was most severely felt throughout the country; in many parts the water in the ponds used for cattle was entirely exhausted, and none could be procured except from the rivers, in many instances at a considerable distance from the farmer's dwellings. Grass had become so universally scarce, that the farmer was obliged to feed his cattle with hay as in the severest winter.—(PUB. LEDGER, *September* 25.)

For these three weeks past it has rained in Wales almost every day. A gentleman just returned from thence states, that there was no shooting in the beginning of the month, on account of the constant and heavy rains.

(PUB. LEDGER, *September* 28.)

It appears from the papers, that much damage was done in Scotland by violent thunder storms, attended with inundations from excessive falls of rain on the 24th, 25th, and 26th of the ninth month.

Seventh Month, 28, 1815.

Being on a journey, I lodged this night at the hospitable mansion of a friend in Yorkshire. The scite commands an extensive and pretty deep valley, in which lies the town of Bradford with a considerable scattered population, and, in the bottom of the valley over against the house, some iron-works. When it grew dark, the large coke fires and flaming chimneys of the latter made a conspicuous appearance, representing a mass of buildings in a state of conflagration. Having enjoyed this spectacle over-night, and happening to wake at an early hour next morning, I looked out, to see what appearance the works would then put on. To my surprise for the moment, the various objects which I had before contemplated were not now to be found! An immense *Stratus* had risen, and filled the valley: its level surface, on which the light of the morning began to be spread, lay stretched out like a lake, bounded by the opposite hills. But turning my view a little to the left, I recognized the situation of the iron-works by the smoke and flames of the principal furnace, still rising from under this sea of vapour, in a manner which forcibly recalled the description of a submarine volcano. The smoke spread itself horizontally upon the surface of the cloud, probably by the effect of an opposite electricity; but the sun's rays presently began to disturb this arrangement, the *Stratus* was dissipated by six o'clock, and a fine day, as to this neighbourhood, was the result.

Proceeding, however, the same morning on my journey, and passing the mountainous ridge called Blackstone Edge into Lancashire, I remarked that, precisely at the summit of the ridge, we left the fair weather behind us, and encountered the first of a series of showers (at intervals indeed heavy rain), which continued the whole way to Liverpool.

TABLE CXI.

	1815.		Wind.	Pressure.		Temp.		Hygr. at 9 a. m.	Rain, &c.
				Max.	Min.	Max.	Min.		
9th Mo.	L. Q.	Sept. 26	S	29·79	29·63	66°	42°		23
		27	SW	30·06	29·79	61	34	72	13
		28	SE	30·06	29·46	59	42	80	—
		29	W	29·51	29·28	65	44	81	34
		30	SW	29·49	29·45	58	45	60	17
10th Mo.		Oct. 1	SW	29·72	29·49	62	39	71	13
		2	NW	30·11	29·72	60	33	77	—
	New M.	3	S	30·11	29·93	61	43	83	
		4	S	29·97	29·95	62	37	65	
		5	S	29·95	29·81	66	50	80	—
		6	N	30·08	29·81	63	34	90	50
		7	NW	30·20	30·08	59	37	79	
		8	NE	30·22	30·19	56	39	85	
		9	E	30·19	30·02	57	39	80	
	1st Q.	10	E	30·02	29·72	55	39	63	
		11	E	29·72	29·62	55	45	56	54
		12	NW	29·73	29·62	57	37	75	
		13	Var.	29·73	29·65	62	51	70	
		14	SW	29·76	29·65	60	42	60	
		15	SW	29·82	29·79	60	47	73	5
		16	S	29·73	29·71	62	46	75	
		17	SW	29·85	29·73	59	35	73	—
	Full M.	18	SE	29·85	29·52	56	46	77	18
		19	SW	29·52	29·25	63	49	83	16
		20	SW	29·45	29·25	61	45	60	—
		21	SW	29·82	29·45	59	33	70	
		22	S	29·85	29·57	57	42	77	
		23	S	29·57	29·47	59	50	65	39
		24	SW	29·47	29·42	59	42	89	10
				30·22	29·25	66	33	74	2·92

NOTES.—Ninth Mo. 26. A rainy sound in the trees this morning, from a gale at S: this was followed by rain, during which the wind veered westward. 27. Damp a. m., somewhat misty air: *Cirrus*, with *Cirrostratus:* much wind and a heavy shower by noon, with a suspicious sound, like thunder, at a distance: p. m. a second shower, after which a fine bow in the E, and some distinct *Nimbi*, the elevated crowns of which continued to reflect the light for 30 minutes after sunset. 28. A wet mist a. m., very little wind, the vane, which stood to N, turning to SE: sunshine, with *Cumulus* at noon: large *Cirri* p. m., which were permanent. 29. Rainy appearances in the sky a. m., soon followed by a shower, which came over from SW: much *Cirrostratus* followed, with more rain. 30. Clear a. m.: wind NW: p. m. a veil of *Cirrostratus* advancing from W, completely obscured the sky: in the night a beating rain from the southward.

Tenth Mo. 1. As yesterday, a. m.: showers, with rainbow, p. m.: rain by night. 2. Misty morning: much dew: *Cumulostratus*, and a few drops: luminous twilight. 3. Hoar frost: misty air: *Cumulus*, capped with a delicate double sheet of *Cirrostratus: Cirrocumulus* and inosculation followed. 4. *Cirrostratus* in a close veil most of the day. 5. Misty morning: then large *Cirri*, arranged from SE to NW, and passing to *Cirrocumulus*, &c.: rain at night. 6. Wet morning: fair p. m. 7. Hoar frost: slight *Stratus:* a serene day: much dewy haze at sunset, coloured red, first in the E, then in the W above an orange tint. 8. Cloudy a. m. 14. A lunar halo of moderate diameter, which, disappearing, gave place to a portion of a very large one. 15. Rain: the wind fresh at night from SSW. 16. *Cumulus* a. m.: fine day: a number of swallows, which re-appeared at the end of last month, have kept about our neighbourhood to the present time. 17. Large *Cirri*, passing to *Cirrostratus:* a little rain p. m.: *Nimbi*. 18. *Cirrostrati* a. m., with obscurity gradually increasing: wet p. m.: much wind, evening. 19. Coloured sunrise: calm, overcast a. m.: then windy, with driving showers, the sky filled with cloud: a tempestuous night. 20. Coloured sunrise, and much wind: a few drops of rain: cloudy night. 21. Clear a. m.: then *Cumulus* in a very blue sky, passing to *Cumulostratus*, which, with some beds of *Cirrus* above, was finely coloured at sunset: I suspected thunder and rain far to the S this afternoon. 22. Misty: much dew: *Cirrostratus, Cumulostratus, Cirrus*. 23. Maximum of temperature at nine this morning: little dew: cloudy: windy: rain. 24. Misty sunrise a. m., with *radii* through broken clouds: a *Nimbus* in SW: rain: about sunset *radii* again, followed by many distinct *Nimbi*.

RESULTS.

Winds chiefly from the S and W.

Barometer:	Greatest height	30·22 in.
	Least	29·25 in.
	Mean of the period	29·747 in.
Thermometer:	Greatest height	66°
	Least	33°
	Mean of the period	50·79°
Mean of the hygrometer		74°
Evaporation (at the Laboratory)		2·12 in.
Rain		2·92 in.

TABLE CXII.

	1815.		Wind.	Pressure.		Temp.		Hygr. at 9 a. m.	Rain, &c.
				Max.	Min.	Max.	Min.		
10th Mo.	L. Q.	Oct. 25	SW	29·39	29·33	57°	39°	80	
		26	E	29·45	29·43	53	32	71	
		27	NE	29·65	29·45	50	43	80	26
		28	NE	29·98	29·65	51	43	81	35
		29	NE	29·98	29·86	56	47	75	
		30	NE	29·92	29·86	50	44	57	—
		31	NE	29·94	29·92	51	36	60	
11th Mo.	New M.	Nov. 1	NE	29·93	29·92	50	41	65	
		2	N	30·23	29·93	51	33	60	
		3	N	30·35	30·23	47	25	61	
		4	S	30·35	30·25	44	30	87	—
		5	SW	30·25	30·17	51	34	70	—
		6	W	30·17	30·06	52	40	80	15
		7	W	30·06	29·99	53	32	83	—
		8	W	29·99	29·78	53	41	85	—
	1st Q.	9	SW	30·06	29·78	57	41	75	35
		10	SW	30·05	30·02	56	44		
		11	SW	30·02	29·85	56	48	78	—
		12	S	29·85	28·99	57	48	78	75
		13	W	29·07	28·95	51	35	71	3
		14	NW	29·10	29·01	44	26	65	
		15	Var.	29·28	29·10	41	27	77	—
	Full M.	16	NW	29·50	29·28	35	25	75	8
		17	NW	29·90	29·50	36	21	90	—
		18	NW	30·06	29·90	35	18	85	
		19	Var.	30·06	29·72	35	25	80	
		20	NE	29·62	29·60	42	33	80	
		21	NE	29·80	29·60	42			
		22	NE	30·09	29·80		25		
				30·35	28·95	57	18	76·5	1·97

NOTES.—Tenth Mo. 25. Lightning to the N and W last evening. 27. The wind changed to NE this morning: *Cumulostratus*, with inosculation, a. m.: wet p. m. 28. wet a. m.: fair p. m.: rain again at night: windy. 22. A brisk gale at NE, continued through the day and night: a bank of *Cumulostratus* was visible in the morning in the S, from which quarter *Cumuli* were propagated northwards, changing the state of the superior clouds as they advanced: some *Cirri* in long lines above the whole were not affected: a solar halo appeared from one to 2 p. m., and the sky was turbid beneath the sun. 30. Completely overcast a. m.: windy, drizzling at intervals. 31. *Cirrostratus* tending to *Cirrocumulus*, a. m., beneath large *Cirri* pointing NE and SW: fair.

Eleventh Mo. 1. Low *Cumulostratus* beneath *Cirrostratus:* a breeze at NE, changing at night to NW, without affecting the state of the clouds, which were dense p. m. 2. Breeze at NW a. m.: barometer very steady: *Cumulostratus:* much redness in the twilight. 3. Clear a. m., with *Cirrostratus:* slight hoar frost: coloured sunset. 4. Clear a. m., with a little *Cirrostratus:* very white hoar frost, with ice: a fine day: after sunset, a dull purple in the E, with a little orange in the W: the moon conspicuous, the crescent indifferently defined, and pale. 5. Rain by 7 a. m.: after which low *Cumulostratus.* 6. A few drops a. m., with the wind S: then fine. 7. Cloudy: rain: lunar corona. 8. Some drops a. m.: then much *Cirrostratus:* sunset, with streaks of brown and purple on a yellow ground: moon visible, but its light peculiarly dim: wind and rain in the night. 9. Wet morning: dripping day: lunar corona: wind. 10. Fair, with *Cirrostratus.* 11. A little rain at night: *Cirrostratus.* 12. A fair warm day: various clouds passed over with a moderate wind: at evening the moon showed a lucid corona: to which succeeded (the wind having risen and veered to S) a continued exhibition of coloured halos varying in diameter, formed on low, rapidly passing, curling clouds, with an occasional corona, of pale green or yellow, between: a most tempestuous night followed, with rain. 13. Windy: a shower p. m.: the moon gold-coloured. 14. Clear: wind moderate. 15. Cloudy a. m.: windy: a sensible odour of electricity in the air at 1 p. m. 16. A snowy morning: fair p. m. 17. White frost a. m.: little of yesterday's snow remaining: the wind SW: a breeze: a little rain: p. m. a waggon from the north came thickly covered with snow: wind brisk at N at night. 18. Hoar frost: the moon looks like a map, so great is the transparency of the higher atmosphere. 19. Hoar frost and rime on the trees: bodies of thin mist, probably *Cirrostratus,* moved quickly over us this morning from the SW, rendering the tree tops invisible: a fine day: *Cirrus* and *Cirrostratus* at night. 20. *Cumulostratus* a. m.: maximum temperature at nine. 21. *Cirrus* a m.: *Cirrostratus:* minimum temperature at nine. 22. Fair, with hoar frost.

RESULTS.

Prevailing Winds Northerly, interrupted by a Southerly current, which greatly depressed the barometer, soon after the middle of the period, and was followed by a sharp frost.

Barometer:	Greatest height	30·35 in.
	Least	28·95 in.
	Mean of the period	29·783 in.
Thermometer:	Greatest height	57°
	Least	18°
	Mean of the period	41·75°
Mean of the hygrometer		76·5°
Rain		1·97 in.

TABLE CXIII.

	1815.		Wind.	Pressure.		Temp.		Hygr. at 9 a. m.	Rain, &c.
				Max.	Min.	Max.	Min.		
11th Mo.	L. Q.	Nov. 23	N	30·28	30·09	37°	29°	80	
		24	NW	30·46	30·28	40	29	86	—
		25	NE	30·58	30·46	43	29	95	
		26	NE	30·58	30·29	40	31	90	
		27	NE	30·29	30·04	39	29	87	—
		28	Var.	30·02	29·92	35	23	74	
		29	SW	30·02	29·84	36	25	86	—
	New M.	30	S	29·75	29·70	49	36	90	18
12th Mo.		Dec. 1	SW	30·04	29·75	53	41	93	—
		2	SE	30·04	29·96	53	42	95	14
		3	W	29·96	29·71	50	37	96	22
		4	NW	29·82	29·70	46	39	92	—
		5	NW	29·35	29·31	48	37	66	38
		6	N	29·75	29·30	43	36	63	8
		7	NE	29·98	29·75	36	24	72	
	1st Q.	8	NE	30·05	29·98	30	23	59	
		9	N	30·35	30·05	32	25	61	
		10	N	30·37	30·33	43	30	75	
		11	NW	30·37	30·25	38	29	66	
		12	W	30·36	30·20	40	27	80	
		13	SW	30·27	30·15	44	27	90	
		14	SW	30·15	29·75	44	30	90	14
		15	SW	29·75	29·00	49	44	90	13
	Full M.	16	NW	28·90	28·85	44	31	65	—
		17	W	29·33	28·90	36	24	67	—
		18	SW	29·55	29·33	34	23	78	
		19	S	29·55	29·10	45	24	80	54
		20	SW	29·29	28·98	47	35	96	31
		21	NW	29·56	29·29	39	26	66	
		22	SW	29·70	29·56	33	27	90	—
				30·58	28·85	53	23	80	2·12

NOTES.—Eleventh Mo. 23. Serene, with hoar frost. 24. Hoar frost: light rain for a few minutes, p. m. 25. Hoar frost, with *Cirrostratus* in the horizon: steady breeze. 26. Hoar frost: the clouds coloured at sunrise: clear p. m. 27. Overcast a. m.: some light rain a. m.: *Cumulus* capped, and inosculating with *Cirrostratus*, p. m. 28. Fine: the ground lightly covered with granular snow. 29. Hoar frost: about 1 p. m. a slight snow, granular, and in stars: in the evening a mist over the marshes: and at about $8^h\ 30'$ p. m. a brilliant meteor. It resembled a sky-rocket, and fell almost directly down with an uniform motion, blazing out larger before it became extinct. This meteor, with two others which I lately saw in the same quarter (SW) passing in the same track at about a minute's interval, had very much the appearance of a simple electrical discharge between two horizontal beds of cloud at different elevations. 30. Wet a.m.: cloudy p.m., the wind rising at S and SE.

Twelfth Mo. 1. Much wind and early, with rain. 2. Fine a.m., with *Cirrostratus:* then *Cumulus*, with *Cirrus*. 3. Very dark a.m., with clouds: wind SE: p.m. *Cumulostratus*, after which *Nimbus* in the horizon: the new moon conspicuous in an opaque twilight. 4. A wet morning: windy at SW: in the fore part of the night much wind. 5. Notwithstanding the dryness of the air, which was also clear below, there was this forenoon a continuous cloud above at a great height, with a hollow sound in the wind. We had a steady rain after this, and a gale of wind in the night. 6. Much wind: *Cumulus*, with *Cirrostratus:* wet p.m.: a gale through the night, shifting to N and NE. 7. Cloudy a.m.: the barometer, which the NW wind failed to bring up, now rises, with a continued hard gale from NE: the hygrometer receded to 51°: in the evening the moon's disk appeared small, and its light scanty, though no visible cloud intervened. 8. Clear, dry, windy morning. 9. Steady breeze: clear: hygrometer receded to 48°. 10. Sleet a.m.: lunar halo, evening. 12. For these three days past we have had a pleasant, clear air, with a fragrant smell, like that which exhales from the dry turf after showers. 13. Cloudy a.m.: drizzling: the windows of a room without a fire, for the first time this season, collect moisture on the *outside*, remaining dry within: sounds come louder than usual from the NE. 14. Hoar frost: a fine day: after dark, a lunar corona, occasioned by bars of *Cirrus* pointing N and S, and appearing to converge in the horizon. These soon passed to *Cirrostratus*, and were followed by wind and rain from the southward. 15. Much wind: cloudy: some rain: a very stormy night, with showers. 16. *Cumulus*, mixed with *Cirrostratus:* early in the afternoon the lofty summits of the former, rising from a fore ground of the latter on the E horizon, presented the resemblance of an Alpine landscape. In the evening, and on 17, a.m. the wind NW, with *Nimbi*, bringing some snow, followed by much cloud, and a gale at evening. 18. Fine day. 19. Hoar frost: clear: then overcast from the south, and some snow in large loose grains. In the evening more snow, followed by rain from S. 20. Cloudy a.m.; much wind at S, with a hollow sound: rain p.m., and a gale through the night. 21. Fine morning: the ground slightly frozen. 22. Very white frost: *Cirrus* above, and *Cirrostratus* to the SE: a little granular snow on the ice. Snow in the night.

RESULTS.

Winds Variable, but with a larger proportion of Northerly than usual at this season.

Barometer:	Greatest height	30·58 in.
	Least	28·85 in.
	Mean of the period	29·839 in.
Thermometer:	Greatest height	53°
	Least	23°
	Mean of the period	35·96°
Mean of the hygrometer		80°
Rain		2·12 in.

ST. PETERSBURGH, *November* 22.—The weather is still mild, and the navigation quite open; merchantmen arrive and depart from Cronstadt daily.

HAMBURGH, *December* 8.—By the severe frost which we have had for these two days, the Elbe is covered with ice almost to Blankenese, and the navigation entirely interrupted.

The Lark packet arrived at Harwich on Friday from Cuxhaven. A dreadful hurricane was experienced on the opposite coast, which continued from the 7th to the 9th instant.—(PUB. LEDGER.)

It appears by the papers, that this gale was exceedingly destructive to the shipping on our own eastern coast.

METEOR IN CONNEXION WITH AN EARTHQUAKE.

Extract of a letter dated *Lisbon*, February 2, 1816.—"At about five minutes before one (this morning) I felt my bed move up and down for about a minute, or a minute and a half: the shaking increased after this, changed its direction from side to side, and was very severe.—I opened my window, the atmosphere was dense (misty); a thick fog covered the whole city, yet I could see the lamps of the further end. On a sudden every thing was light, and *a meteor* was seen, which approached the earth, and of itself dissipated, and all was again in darkness. My thermometer in the room was at 60° or 62°. Every thing then became quiet until 7 p. m., when another more trifling shock was felt. For two days past we have all been noticing the oddity of the weather. All the morning dull, close, and very cloudy—no sun; wind north; no rain: at about one o'clock wind changed to south, blowing a hurricane, and dreadful rains. Last night the rain cleared off; and although the wind did not change, a thorough calm followed.

"The rain since the shock at seven has been incessant, and particularly heavy—a loud rumbling noise attended the great shock."

(ANNUAL REGISTER.)

Temperatures of Tottenham and Plymouth compared.

In the Results of Table XLII. I have inserted a comparison (from data furnished by a friend) of the respective Temperatures of Tottenham and *Exeter*, during the second month, 1810. My friend, James Fox, jun. has since gone into a comparison of the Temperatures of Tottenham and *Plymouth*, for the years 1814 and 1815, the Results of which may be seen in the Annals of Philosophy, vol. viii. p. 434–5.

The Mean Temperature of Plymouth for these two years, taken together, is 49·95°; of Tottenham, for the same period, 48·31°; difference in favour of the former 1·64°. This is a result which I have deduced from the above communication; and it is what we might have expected, Plymouth being near a degree *south* of Tottenham. But it appears that the greater warmth of Plymouth is chiefly found in the *nights* (which are warmer than ours nearly throughout the parallel), as also in the days of *winter*, when these are inclined to frost. In *summer* the days attain a higher Temperature about London, and the difference is considerable; the heat at Plymouth being then kept down by the same means (the vicinity of a great exposure of sea) which moderates to that part of the island the cold of winter. Thus it is proved by the evidence of the thermometer, that the climate of Devon is entitled (in conformity to general opinion heretofore) to the character of a more *equable*, and consequently, in the case of invalids, a more salubrious temperature than our own.

TABLE CXIV.

	1815.		Wind.	Pressure.		Temp.		Hygr. at 9 a. m.	Rain, &c.
				Max.	Min.	Max.	Min.		
12th Mo.	L. Q.	Dec. 23	SW	29·70	29·27		32°	83	
		24	SW	29·50	29·25	42°	27	80	
		25	SW	29·78	29·53	36	21	76	
		26	SW	29·53	29·00	43	40	83	—
		27	Var.	29·86	29·00	41	25	80	—
		28	SW	29·88	29·75	46	32	77	39
		29	NW	30·09	29·88	50	41	77	—
	New M.	30	SW	30·52	30·09	43	22	55	
1816.		31	SW	30·52	30·33	35	24	90	
1st Mo.		Jan. 1		30·33	30·20	39	22	94	
		2	NW	30·20	30·01	33	21	80	
		3	SW	30·32	30·00	38	24	90	
		4	SW	30·32	30·14	37	26	95	
		5	SW	30·14	29·79	45	34	77	
		6	W	29·78	29·60	49	35	91	6
	1st Q.	7	NW	29·78	29·63	40	32	61	13
		8	S	29·40	29·30	49	41	94	13
		9	SW	29·34	29·31	48	41	67	13
		10	W	29·31	28·90	50	41	70	24
		11	NW	29·42	28·90	47	36	61	
		12	SW	29·42	28·96	43	32	55	17
		13	SE	29·15	28·87	39	29	79	2
	Full M.	14	S	29·32	29·26	43	31	86	5
		15	W	29·56	29·08	42	33	91	27
		16	SW	29·35	29·20	47	34	67	44
		17	SW	29·63	29·35	39	30	75	
		18	SW	29·64	29·60	42	29	80	—
		19	SW	29·64	29·45	40	29	98	10
		20	W	29·45	29·16	38	29	85	5
				30·52	28·87	50	21	79	2·18

NOTES.—Twelfth Mo. 23. A thaw p. m., with a little rain: windy night. 24. Dew and *Cirrostratus*, a. m.: cloudy at intervals: windy at SW, yet it froze in the evening. 26. Maximum of temperature at 9 a. m., and beginning to rain: much wind, especially about sunset. 27. It is said to have lightened much, early this morning: a stormy day, with rain and snow. 28. Temperature at the minimum at nine: snow: sleet: rain. 29. Temperature at maximum at nine: a little rain: a gale through the night. 30. Fine morning, though with a pale sky: *Cirrostratus*, coloured at sunset: the river Lea rose higher, apparently by the tide, than at any time since 1809. 31. Hoar frost: a frozen mist, with *Cirrostratus* above, followed by a fine day.

1816. First Mo. 1. Misty air: *Cirrostratus.* 2. Hoar frost: a frozen mist, depositing much rime; the middle of the day fine. 3. Fine morning: the roads icy, it having thawed some part of the night. 4. Hoar frost: *Cirrostratus* in flocks: a breeze. 5. Coloured sunrise: fine, with *Cirrostratus.* 6. Maximum temperature at nine: cloudy: the wind rising: very heavy *Cumulostrati,* after some rain: clear windy night. 7. Minimum of temperature at nine: elevated *Cirrostratus* in bars, just visible: wind and clouds: a lunar halo. 8. Maximum temperature at nine: wet morning. 10. Much cloud, with *Nimbi* forming, p.m.: stormy night. 11. A gale through the day and night: much evaporation evident in consequence: lunar halo. 12. *Cirrostratus* descending from above: a gale, with rain after. 13. Fair day. 14. After frost in the night, a shower early: drizzling p.m. 15. Overcast with *Cirrostratus:* rain: clear at night. 16. A slight ground frost: large *Cumuli,* mixed with other modifications, p.m. which going off, showed elevated in the N and NE: to these succeeded linear *Cirri,* filling the sky, and crossing each other almost at right angles: these appearances were followed by a most violent storm of wind and rain in the night. 17. Fair: wind at night. 18. Minimum temperature at nine: hoar frost: misty horizon: *Cirrocumulus,* followed by denser clouds, and rain at evening. 19. Maximum temperature at nine: very misty: at noon a bank of dense clouds of various modifications in the S: windy at evening: rain in the night. 20. Fair day. 21. Wet morning: the wind SE.

RESULTS.

Prevailing Wind SW.

Barometer:	Greatest height	30·52 in.
	Least	28·87 in.
	Mean of the period	29·615 in.
Thermometer:	Greatest height	50°
	Least	21°
	Mean of the period	36·52°
Mean of the hygrometer at 9 a. m.		79°
Rain		2·18 in.

THUNDER STORM.

A few days since, was experienced such a storm of thunder and lightning, at *Gainsborough,* as scarcely ever was known at this season of the year.

(PUB. LEDGER, *December* 30.)

TABLE CXV.

	1816.		Wind.	Pressure.		Temp.		Hygr. at 9 a. m.	Rain, &c.
				Max.	Min.	Max.	Min.		
1st Mo.	L. Q.	Jan. 21	SE	29·30	29·15	46°	37°	92	16
		22	SE	29·42	29·30	44	36	90	
		23	SE	29·42	29·16	43	37	93	—
		24	E	29·16	29·01	43	34	81	17
		25	NE	29·17	29·01	39	34	86	
		26	NE	29·52	29·17	40	34	96	3
		27	N	30·00	29·52	41	29	76	—
		28	N	30·30	30·00	36	29	78	—
	New M.	29	NE	30·38	30·30	33	23	84	
		30	SE	30·38	30·27	32	21	85	
		31	SW	30·27	29·93	34	21	74	
2d Mo.		Feb. 1	SE	29·93	29·64	35	19	75	
		2	SW	29·64	29·42	40	26	85	25
		3	S	29·47	29·43	48	37	100	
		4	SW	29·40	29·37	45	33	98	—
		5	S	29·37	29·09	39	35	100	15
	1st Q.	6	SE	29·09	28·90	38	31	97	—
		7	NE	29·31	28·90	31	15	77	1·38
		8	N	29·62	29·31	24	7	76	
		9	E	29·68	29·62	20	—5	80	
		10	SW	29·77	29·65	30	19	75	
		11	N	30·25	29·75	37	18	60	—
		12	N	30·35	30·25	32	11	56	
	Full M.	13	Var.	30·31	30·24	36	22	72	
		14	W	30·36	30·31	39	25	88	
		15	SW	30·35	29·96	44	32	99	—
		16	NE	29·82	29·73	47	33	75	
		17	NW	30·04	29·82	38	26	56	—
		18	SW	29·88	29·77	41	27	54	—
		19	SW	29·96	29·88	45	37	80	7
				30·38	28·90	48	—5	81	2·21

NOTES.—First Mo. 21. A dripping day. 22. *Nimbi* grouped with other clouds: fine at midday. 23. Overcast. 24. Drizzling: rain in the night. 25. Overcast. 26. The same: a fog on the Thames appeared from hence to be a dense bank of cloud in the horizon: a little rain by night. 27. Fresh breeze: cloudy: p. m. a shower, with hail: night frosty. 28. Fresh breeze: drizzling rain: snow: fair p. m. 29. Hoar frost: cloudy: fair. 30. Very white frost: misty horizon: sunshine after. 31. As yesterday, a. m.: at noon hygrometer 50°: the dust flies: wind SW p. m., with the usual sound for rain.

Second Mo. 1. Hoar frost: fair. 2. Ice now about two inches thick: after hoar frost, a misty thaw: wet and windy evening. 3. Fair: moisture on the outside only of the windows. 4. Strong breeze at 8: misty: rain, followed by *Cumulus*, with *Cirrostratus*. 5. Very misty: the trees dripping. 6. Small and heavier rain by intervals: sleet at evening. 7. A gale from NE, which came on last night, has brought a deep snow: snowy at intervals through the day. 8. A smart breeze, with clear sunshine: the roads sloppy at midday: some distant clouds in the horizon at sunset. 9. A continued sunshine produced not the least effect on the ice to-day: hygrometer at 3 p. m. 47°: there was a mistiness perceptible, to a certain height, round the horizon: the wind a gentle breeze. 10. For remarks on this night, see the sequel. 11. Hygrometer as yesterday nearly: sleet, snow, and rudiments of hail, in minute quantity. 15. After three days of clear sky (a little *Cirrostratus* excepted), an extremely misty air: different clouds followed, and a few drops by inosculation. 16. *Cirrostratus* in flocks a. m.: wind changed to SW, then to NW, and blew strong at night: hygrometer receded to 46°. 17. Frost on the ground, from evaporation merely: the air by two thermometers not below 39°: the snow mostly gone; but a very thick ice remains on the water: *Cumuli* rose this morning, and passed to large spreading *Cumulostrati*. 18. Obscurity to the NE: snow, p. m. which melted in the night.

RESULTS.

Winds Northerly and Easterly.

Barometer:	Greatest height	30·38 in.
	Least	28·90 in.
	Mean of the period	29·696 in.
Thermometer:	Greatest height	48°
	Least	–5°
	Mean of the period	32°
Mean of the hygrometer at 9 a. m.		81°
Rain and melted snow		2·21 in.

A night on which Fahrenheit's thermometer remains for some hours below *Zero*, is, in this climate, a rare occurrence: probably not above five of them fall within a century; the last appearing to have been 19 years ago. It is observable that this extreme low temperature is not, as might be expected, peculiar to long continued frosts, but happens rather at an interval of one winter after such a season. Such was the frost of 1794-5, which lasted 44 days, one whole day's remission excepted, immediately before which the thermometer had descended to

— 2; but in 1796-7, I find a temperature recorded of — 6, 5, with circumstances that indicate its having continued below *Zero* for some hours. Again, the character of the winter before last will be fresh in remembrance: the minimum of that season appears to have been not lower than 5°; and we have now a depression reaching to — 5. I do not, however, lay much stress on this analogy, which is pointed out rather for the use of future observers.

I was prepared to expect the intense cold of the night of the 9th to 10th of Second month, by the circumstance of a temperature of 7°, (or probably 5°) on the night before, being followed by a clear sky, with the wind at E, and a maximum for the day of only 20°. Early in the evening, on trying the experiment of placing a wet finger on the iron railing without, it was found to adhere immediately and strongly to the iron. I exposed several thermometers in different situations. At 8 p. m., a quicksilver thermometer, with the bulb supported a little above the snow, stood at *Zero:* at 11 p. m., a spirit thermometer in the same position indicated — 4; the former, which had a pretty large bulb, had not sunk below — 3. At half-past 7 a. m., the 10th, a quicksilver and a spirit thermometer, hung over-night about eight feet above the ground, indicated respectively — 3, and were evidently rising. The thermometer near the surface of the snow had fallen to — 5, and probably lower; but at the usual height from the ground of my standard thermometer, the temperature was at no time *below* — 5. The exposure is north, and very open.

From 8 a. m. the thermometer continued to rise steadily: at noon a temperature of 25° was pleasant, by contrast, to the feeling, and it was easy to keep warm in walking without an upper coat. Even at *Zero,* however, the first impression of the air on the skin was not disagreeable, the dryness and stillness greatly tending to prevent that sudden abstraction of heat which is felt in moist and quickly flowing air. Early in the afternoon the wind changed all at once to SW; some large *Cirri,* which had appeared all the day, passed to *Cirrocumulus* and *Cirrostratus,* with obscurity to the south. I now confidently expected *rain* (as had happened in former instances), but was deceived; and the thaw took place with a dry air for the most part, and with several interruptions by night.

During these two days the barometer, which had risen rapidly, fluctuated between 29·6 and 29·7 inches, and immediately afterward resumed its course, and rose at the same rate as before.

The mean temperature of this period is precisely 32°; and it is remarkable, that the mean temperature of each of three similar periods of frost, comprehended in the long winter of 1813-4, does not vary a degree from 32°; though preceded and followed by periods which respectively exhibit a mean of about 44°. On examination, I perceive that this analogy might be extended further.

The gale at NE, with which this frost came in, brought with it abundance of snow, which loaded the trees to their tops, and weighed down the smaller shrubs to the ground. The peculiar clinging quality of some snows merits inquiry. It is in part the result of the needly crystallized texture, aided by a degree of moisture attending, which afterwards freezes in the mass; but as light volcanic ashes have been found likewise to possess this quality, and in a still higher degree, perhaps we ought to attribute something to the electric charge with which each of these light bodies arrives at the earth. The seasonable covering which snow affords to the vegetable kingdom is matter of common remark; but it is not so generally understood in how great a degree the very circumstance of its production abates the first rigour of the cold. Just before this snow the air was extremely moist; the snow cleared it of an inch and a half, nearly, of water, and it has since indicated considerable dryness. Now it is quite probable that the *vapour* which afforded this water was found, by the supervening NE current, diffused in our local atmosphere, and by it decomposed. In this case the *latent or constituent heat* given out by the vapour in passing to the solid state, must have gone in great part to raise the temperature of that current. Hence a considerable interval, of gradually increasing cold, before we experienced its extreme effects; during which, too, the earth got provided with its accustomed covering.

After a copious fall of snow, an observer may find, in the scenery which it forms, some things on which to exercise his powers of reflection. The pensile drifts, which in a mountainous country are objects of just alarm, may be contemplated, here, to discover the principles of their construction, and the manner in which they rest on so narrow a base. When the sun shines clear, and the temperature is at the same time too low for it to produce any moisture, the level surface may be found sprinkled with small polished *plates of ice*, which refract the light in colours as varied and as brilliant as those of the drops of dew. At such times, there are also to be found on the borders of frozen pools, and on small bodies which happen to be fixed in the ice and project from the surface, groups of feathery crystals, of considerable size, and of an extremely curious and delicate structure. From the moment almost that snow alights on the ground, it begins to undergo certain changes, which commonly end in a more solid crystallization than that which it had originally. A notable proportion evaporates again, and this at temperatures far below the freezing point. On the night of the 10th of the second month I exposed 1000 grains of light snow, spread on a dish (which had previously the temperature of the air), of about six inches diameter. In the first hour after dark it lost five grains; in the second, four grains; in the third it acquired a grain, the wind having changed, and the temperature, which had been falling from 25°, inclining to rise again. The hygrometer was at 50°, with a gentle breese at east. In the course of the night the loss was about 60 grains. This evaporation from snow may very well supply the water for forming those thin mists, which appear in intense frost: and the slight increase during a part of the time, in this experiment, may throw light on the formation of the secondary icy crystallizations above-mentioned. It appears that the air in a still frosty night becomes partially loaded, either with spiculæ of ice, or with particles of water, at a temperature below freezing, and ready to become solid the moment they find a support. Hence the rime on trees, which is found to accumulate chiefly on the windward side of the twigs and branches.

As to those more copious mists, of the modification *Stratus*, which accompany the setting in of long frosts, I conceive them to originate in part from the yet unfrozen rivers, and other waters, near which they are most abundant; in part from the moisture of the earth itself: for it is contrary to experience to suppose, that the frozen state of the surface can prevent the ascent of vapour from the porous soil below: which will continue to emit it, until its temperature becomes, by the gradual penetration of the frost, nearly on a level with that of the cold air then constantly flowing over it, though too gently to disperse the cloud formed.

◆

The snow on the Grampian Hills, in Scotland, is at this time of a greater depth than has been known for the last 20 years. Vast flocks of grouse have come down from them for shelter.—(Pub. Ledger, *February* 23.)

Earthquakes felt at Sea.

Extract of a letter from *Madeira*, dated February 5.—"On the 1st instant, about 12 o'clock at night, a severe shock of an earthquake was felt all over the island; and the following morning, at four o'clock, another shock was felt."

The shock of an earthquake, which we lately stated, was experienced at *Lisbon*, about one in the morning of the 2d February, was repeated, rather more slightly at seven. The first is supposed to have lasted from two and a half to three minutes, and was generally and regularly felt in the whole city.

February 27.—A few days since the Ann transport, A. Clarke, master, arrived at Portsmouth, from Antigua. On the 2d February at 45 minutes past 11 a. m. being a little to the southward of the latitude of Lisbon, and about 150 miles to the eastward of *St. Mary's* (one of the Western Islands), she experienced the shock of an earthquake. The spot precisely was long. 19° 30′ W., lat. 37° 30′ N. The sensation produced was what would have been felt had the ship touched the ground, or her motion been impeded by a strong counter-undulating current; the masts trembled, as they would preceding their fall over the ship's side. The ship was thrown aback, with the sails; and the lead being thrown, with 150 fathoms of line, no ground was touched. At twenty after three o'clock, on the same day, she experienced another shock, which produced the same sensations, but in a much less degree; the ship was then in long. 17° 4′ W, lat. 39° N; the lead was again thrown, and no bottom could be found with 200 fathoms of line. After this period, until three o'clock on the following morning, the 3d instant, several other similar convulsions were felt—but every successive one producing a less effect: the whole number of shocks was 12.

Extract of a letter from Captain Welsh, of the Claudine, arrived in the Downs from Batavia.—" On the 9th of February, off *St. Michael's*, we experienced very tempestuous weather, with a tremendous confused sea. The wind shifting from SW to SE and NE, with constant lightning and heavy rain. On the 10th, at half-past 8 p. m. the ship then under reefed fore-sail and main-stay-sail, we were much alarmed by a severe shock of an earthquake, which lasted four or five seconds.—(PUB. LEDGER.)

TABLE CXVI.

	1816.		Wind.	Pressure,		Temp.		Hygr. at	Rain,
				Max.	Min.	Max.	Min.	9 a. m.	&c.
2d Mo.	L. Q.	Feb. 20	NE	30·00	29·88	47°	34°	70	
		21	W	30·07	30·00	46	36	80	4
		22	SW	30·19	30·07	49	34	75	—
		23	S	30·19	30·11	50	27	80	
		24	SW	30·11	29·99	50	35	98	
		25	SW	30·04	29·85	53	32	70	12
		26							
		27	W	29·75	29·45	51	29		8
	New M.	28	NW	29·88	29·75	40	22		
		29	NW	29·86	29·82	35	25	53	
3d Mo.		March 1	S	29·82	29·43	41	28	59	
		2		29·43	29·15	42	36	75	25
		3	SW	29·25	29·06	45	29	80	10
		4	SW	29·19	29·13	46	26	76	21
		5	S	28·97	28·90	44	32	74	—
		6	SW	29·10	28·92	46	33	67	34
	1st Q.	7	S	29·13	29·02	50	32	76	27
		8	NE	29·32	28·99	43	33	80	18
		9	N	29·67	29·32	38	30	75	—
		10	NW	29·87	29·86	41	26	62	
		11	SW	29·65	29·62	50	41	77	39
		12	SW	29·64	29·50	52	40	90	8
	Full M.	13	W	29·87	29·82	52	38	70	—
		14	SW	29·82	29·32	52	43	83	—
		15	S	29·76	29·32	52	26	58	23
		16	W	29·74	29·67	49	30	73	
		17	SW	29·74	29·49	47	34	60	—
		18	NW	29·56	29·43	52	35	78	17
		19	NW	29·91	29·56	47	34	51	3
				30·19	28·90	53	22	72	2·49

NOTES.—Second Mo. 20. Light clouds. 21. Several birds sing: *Cirrostratus* beneath large *Cirrus*. 22. Cloudy: drizzling: fair: windy. 23. White frost, which speedily went off: there appears to have been a dripping mist in the night: *Cirrocumulus:* fair. 24. *Cirrus: Cirrostratus:* cloudy: hollow wind. 25. A gale from SW, with showers: changed to NW in the night. 27. A snow shower early, which was followed by sleet and rain: much wind in the night. 28. Light *Cirrostratus*, a. m.: windy: *Cumulus* and *Cumulostratus* succeeded. 29. Slight hoar frost: fair, with light clouds: hygrometer went to 42°.

Notes, &c. (*continued*).

Third Mo. 2, 3. Rain at intervals. 4. *Cirri*, a. m. consisting of streamers rising from a horizontal base, with *Cirrostratus* below: heavy clouds: wind: p. m. hail, sleet, rain: lastly, upon the wind getting somewhat northerly, a heavy short storm of snow. 5. Clear a. m.: the ground crusted with yesterday's snow. 6. Various modifications of cloud, a. m.: heavy showers, p. m. 7. Cloudy: some rain, a. m.: *Nimbi*. 8. Rainy. 9. Snow storm: much evaporation: fair night. 10. Fair. 11. Stormy: very wet, p. m. 12. Temperature 50° at 9 a. m.: wind and rain. 13. Much wind: rain at intervals: *Nimbi*. 14. Wet morning: the wind SE: stormy day and night. 15. Much wind: rain, p. m.: calm at night. 16. Hoar frost: fair: calm: hygrometer went to 45°; and although it was overcast through the day, with the usual indications of rain in the sky, yet none fell. 17. *Cirrus*, with other light clouds, a. m.: wet, p. m. 18. Wet morning: hollow southerly wind, which changed to NW, with *Nimbi* at night, and blew strong. 19. A raw blustering day, with much evaporation evident.

RESULTS.

Prevailing Winds Westerly.

Barometer:	Greatest height	30·19 in.
	Least	28·90 in.
	Mean of the period	29·606 in.
Thermometer:	Greatest height	53°
	Least	22°
	Mean of the period	39·46°
Mean of De Luc's hygrometer		72°
Rain		2·49 in.

Character of the period: cloudy, wet, and windy: vegetation has made but little progress.

Earthquake.

On Sunday, March 17, about half-past twelve o'clock, a violent concussion of the earth was sensibly felt at Doncaster, and at Bawtry, Blyth, Carlton, Worksop, Sheffield, Chesterfield, Mansfield, Nottingham, Lincoln, Gainsborough, &c.—(Doncaster Paper.)

On Sunday a smart shock of an earthquake was perceptibly felt in Lincoln, at about ten minutes before one o'clock in the day. The undulation appeared to be from west to east, and lasted from about a minute and a half to two minutes. The wind was at the time SE, cold, and with every appearance of rain. Pictures and other articles hanging on the walls were set in a swinging motion. At Newark, also, and the neighbouring villages, the shock was distinctly felt, as well as at Leicester and Loughborough.—(Stamford Paper.)

TABLE CXVII.

	1816.		Wind.	Pressure.		Temp.		Hygr. at	Rain,
				Max.	Min.	Max.	Min.	9 a. m.	&c.
3d Mo.	L. Q.	March 20	NW	29·96	29·91	47°	32°	•	
		21	E	30·01	29·96	48	28		
		22	SE	30·20	30·01	53	35	70	
		23	E	30·27	30·20	48	34	55	
		24	NE	30·27	30·08	39	34	55	
		25	NE	30·08	30·05	41	34	58	
		26	NE	30·14	30·08	42	35	60	
		27	NE	30·14	30·10	42	33	62	
	New M.	28	E	30·12	30·10	42	33	53	
		29	E	30·16	30·12	48	32	47	
		30	E	30·15	30·12	45	25	51	
		31	SE	30·15	30·07	47	26		
4th Mo.		April 1	SE	30·07	29·80	50	29	61	
		2	SE	29·79	29·75	47	29	53	
		3	SE	29·91	29·79	43	27	49	
		4	E	29·97	29·95	51	26	60	
		5	Var.	29·95	29·58	57	29	75	
		6	SW	29·58	29·11	65	32	55	16
	1st Q.	7	W	29·03	28·95	49	33	60	31
		8	NE	29·16	29·12	48	31	62	
		9	N	29·15	29·09	46	39	65	21
		10	SE	29·44	29·34	55	35	69	—
		11	NE	29·61	29·44	50	38	88	52
		12	NW	29·70	29·61	49	33	86	32
	Full M.	13	N	29·70	29·49	40	24	60	—
		14	NW	29·61	29·49	40	28		3
		15	NW	29·62	29·55	45	32	55	
		16	NW	29·55	29·38	51	40	50	1
		17	NW	29·52	29·38	56	30	59	
		18	SE	29·64	29·48	59	36	56	
				30·27	28·95	59	24	60	1·56

Notes.—Third Mo. 21. Breeze: sunshine. 22. The same. 23. About sunset, a body of shallow *Cumulostratus*, with an abrupt boundary forward, advanced from the E. 24. Cloudy: breeze. 25. The same. 26. The same. 27. The same. 28. Breeze stronger, unsteady: *Cumulus*. 29. Breeze: *Cumulus* passing to *Cumulostratus*, which cleared off at night, leaving a little *Cirrus* above. 30. Close *Cumulostratus*, a. m. resembling drapery, as frequent in cold spring weather: p. m. more open sky. 31. Large *Cumuli*, a. m.: wind SE, gentle: the temperature was 45° at 10 a. m.: the roads are now dusty to an extreme: *Cirrus* passing to *Cirrostratus* at evening.

Fourth Mo. 1. Hoar frost: sunshine: *Cirri*, with haze above.

Notes, &c. *(continued).*

2. *Cirrostratus*, with *Cirrus:* breeze much stronger. 3. Windy: hoar frost: *Cirrus.* 4. Hoar frost: sunshine: *Cirrus*, with *Cumulus:* drains emit an offensive gas. (This is a very common circumstance after long settled weather, before a change, and depends unquestionably in great measure on renewed electrical action on the general surface.) 5. White frost: misty from the N: the wind NE: sunshine: at night a lunar halo of the largest diameter: *Cirrostratus.* 6. The higher atmosphere filling, a. m.: *Cirrus, Cirrocumulus*, &c.: wind N: a smart breeze: then SW: wind and rain in the night. 7. Dripping a.m.: sleet: cloudy: windy: *Cumulostrati*, succeeded by numerous *Nimbi*, letting falling showers of large opaque hail, followed by rain: three distinct peals of thunder, p. m.: one N, another S, and a third near at hand, with lightning. 8. Cloudy: windy. 9. Windy at N, and more so in the night, seemingly from the westward: rain. 10. *Cumulostratus:* some dripping: rain by night. 11. Obscurity early a. m., with *Cirrostratus* beneath to S: rain and wind chiefly from the NE: p. m. moderate weather. 12. Sky as yesterday, but the *Cirrostratus* to NE: rain at mid-day: in the night a gale from NW, with snow for two hours. 13. The high ground to the W and NW is white with snow, a. m.: with us none remains. 14. White frost (8 a. m.), yet cloudy overhead, and a group far to the N, in which were *Nimbi:* in an hour's time this group reached us, and we had showers of heavy granular snow by intervals. 15. Clear morning: dew: fair, though with *Nimbi* in sight: very high tides, and much water out in the marshes. 16. A moderate gale at S and SW: some rain by night. 17. Cloudy a. m.: calm: mild. 18. *Cumulus, Cirrus:* sunshine, with cool breeze.

RESULTS.

Winds for the most part Easterly, non-electric, keen, and drying.

Barometer:	Greatest height	30·27 in.
	Least	28·95 in.
	Mean of the period	29·762 in.
Thermometer:	Greatest height	59°
	Least	24°
	Mean of the period	39·66°
Mean of De Luc's hygrometer at 9 a. m.		60°
Rain		1·56 in.

The mean temperature of this period is full 8° lower than that of the corresponding portion of 1815. It has accordingly presented a striking contrast to the latter in its effects on the vegetable kingdom; not a single day having occurred in it of that which cultivators emphatically denominate "growing weather," when a moist air cooperates with a rising temperature to stimulate vegetable life, and make way for the unfolding of its products.

TABLE CXVIII.

	1816.		Wind.	Pressure. Max.	Pressure. Min.	Temp. Max.	Temp. Min.	Hygr. at 9 a. m.	Rain, &c.
4th Mo.	L. Q.	April 19	SW	30·03	29·64	56°	28°	52	
		20	SE	30·03	29·68	58	36	50	
		21	NE	29·70	29·68	52	44	50	
		22	SE	29·69	29·65	59	51		32
		23	E	29·75	29·69	70	43	65	
		24	NE	29·78	29·69	70	42	58	
		25	E	29·99	29·78	68	39	46	
		26	NE	29·99	29·94	68	39	61	
	New M.	27	NE	29·94	29·81	68	37	56	
		28	SE	29·81	29·50	68	44	56	
		29	W	29·50	29·44	67	47	46	—
		30	SE	29·54	29·42	61	36	57	5
5th Mo.		May 1	SE	29·66	29·54	62	42		
		2	NW	29·87	29·66	63	34	41	—
		3	NW	29·93	29·83	59	48	61	18
	1st Q.	4	SW	29·96	29·78	54	45	60	—
		5	NW	29·80	29·62	61	45	75	22
		6	SW	29·86	29·80	58	40	60	
		7				58	45	46	—
		8	SW	29·86	29·44	60	39		50
		9	SW	29·52	29·40	56	39	60	
		10				54	39	63	—
	Full M.	11	NW	29·40	29·17	54	32		55
		12	NW	29·49	29·17	49	29	58	1
		13	W	29·75	29·49	57	30	53	1
		14	SE	29·77	29·75	62	37	55	5
		15	SW	29·78	29·77	64	44	74	1
		16	NE	29·78	29·64	72	49	54	1
		17	W	29·71	29·64	68	38	48	
		18	NW	29·76	29·71	52	41		
				30·03	29·17	72	28	54	1·91

NOTES.—Fourth Mo. 19. Cloudy a. m.: cool dry wind. 20. Warm forenoon: about noon, a murmuring S wind, with traces of a solar halo. 21. a. m. Obscurity above, with rudiments of the *Cumulus* beneath it: after this, thunder clouds in the S horizon: rain followed these appearances, and continued during most of the forenoon: swallows appeared to-day: the hygrometer went to 70°. 22. Fine: *Cirrus*, *Cirrocumulus*, &c. 23. Very fine day: blue sky, with large *Cumuli*, and the lighter modifications above. 24. Warm forenoon: a smart easterly breeze p. m.: the hygrometer went to 35°: *Cirrus* predominated. 25. Brisk wind at NE and SE: the sky clear and pale. 26. Fine day: steady breeze. 27. Much dew: clear morning: then *Cumulostratus*, with a breeze. 28. Dew: clear morning: *Cirrostratus* appeared, passing afterwards to *Cumulostratus:* at sunset, *Cirrus* appeared above. 29. Little or no dew: the sky full of a confused mixture of *Cirrus*, *Cirrocumulus*, &c.: some drops of rain, followed by more in the night. 30. Overcast: dripping.

Fifth Mo. 1. Fair. 2. Cloudy at intervals, with a few drops: much *Cirrostratus* to the westward. 3. Rain at intervals, chiefly in the night. 4. Completely overcast a.m., with *Cirrostratus:* a wet day. 8. Very rainy p.m., after a little hail about noon. 9. A little rain a.m.: some sunshine p.m. 10. Rainy the whole day. 11. Fair in the evening. 13. A little rain p.m. 17. Very fine day: cool evening. 18. Fair, but cold.

RESULTS.

Prevailing Winds Easterly in the fore part, and Westerly, with rain, in the latter part, of the period.

Barometer:	Greatest height................	30·03 in.
	Least........................	29·17 in.
	Mean of the period............	29·686 in.
Thermometer:	Greatest height................	72°
	Least........................	28°
	Mean of the period............	50·83°
	Mean of the hygrometer..............	54°
	Rain..............................	1·91 in.

During this period the leafing of the more forward trees has proceeded, for the most part, under the retarding influence of cold breezes. Twice, the temperature having risen for a few days, the accumulation appears to have gone off in local thunder storms. In travelling on the 17th of fifth month from Bristol to Southampton, I had the opportunity of observing, from a convenient distance, the gradual formation and discharge of a prodigious *Nimbus*, forming part of a series of clouds, which for several hours continued to pour a flood of rain, accompanied by large hail, thunder, and lightning, on the country about Andover and Winchester. As the sun, which was declining, strongly illuminated these clouds, they reflected a lively copper tint above the indigo ground which marked the heavy rain: the electrical light which fills the striking cloud at each discharge was, therefore, with the stroke itself, imperceptible: but I assured myself of the above-mentioned effects from subsequent information, as we passed over the tract thus plentifully irrigated.

TABLE CXIX.

	1816.			Wind.	Pressure.		Temp.		Hygr. at 9 a. m.	Rain, &c.
					Max.	Min.	Max.	Min.		
5th Mo.	L. Q.	May	19	NE	29·82	29·76	55°	35°	49	
			20	E	29·84	29·82	65	36	51	
			21	NE	29·84	29·77	62	41	48	
			22	NE	29·82	29·77	66	40		
			23	N	29·82	29·77	65	48	60	
			24	N	29·77	29·75	56	50	75	—
			25	SW	30·03	29·77	62	38	70	20
			26	SW	30·03	29·90	66	43	45	28
	New M.		27	NE	30·05	29·90	62	46	73	—
			28	SE	30·12	30·10	66	51	45	
			29	SE	30·10	29·87	69	54		
			30	NW	29·87	29·80	67	49		
			31	NE	30·00	29·80	64	46		
6th Mo.		June	1	NW	30·00	30·00	70	55		
			2	NW	30·00	29·90	72	49		
	1st Q.		3	NW	30·08	29·97	65	46		
			4	SW	30·05	29·90	65	50		
			5	NW	29·96	29·85	67	41		—
			6	NW	29·90	29·80	64	44	38	—
			7	Var.	29·76	29·48	61	46	45	20
			8	W	29·40	29·15	62	42	58	27
			9	NW	29·52	29·35	57	37	70	1
	Full M.		10	NE	29·86	29·52	58	41	47	22
			11	SW	30·00	29·86	65	39	47	
			12	SE	30·00	29·97	70	37	45	
			13	SW	29·97	29·91	75	54	39	
			14	N	29·91	29·87	53	48	53	8
			15	N	29·92	29·86	59	44	57	
			16	NW	29·92	29·92	67	36	47	
					30·12	29·15	75	35	52	1·26

NOTES.—Fifth Mo. 19. Hoar frost: a fine day. 20. Clear morning. 23. Cloudy a.m.: much wind at N. 24. Misty: small rain at intervals. The hygrometer, these two days, noted at 7 a. m. 25. Overcast a. m.: wind at SW: rain, evening and night. 26. *Cumulus* cloud by day: *Cirrostratus* at evening. The hygrometer noted at half-past 6 a. m. 27. A wet morning, succeeded by close *Cumulostratus* through the day. 28—31, inclusive. Fair days.

Sixth Mo. 2. A fine breeze: large *Cirri* and *Cumuli*. 3. *Cirrostratus* prevails, with a cooler atmosphere. 5, 6. Showery. 7—10. Rain. 12. The hygrometer receded to 30°: *Cumulus* prevailed, and was succeeded by *Cirrus* in the evening. 13. This afternoon, there was a fine, but transient display of *Cirrocumulus:* in the N and NW there was an obscurity, mixed with rudiments of *Nimbi.* 14. After a warm, still night, a cold blowing day, with small rain at intervals. 15. Overcast, with *Cumulostratus:* cool breeze: in the evening *Cirrostratus.* 16. A fine day: the air becomes calmer.

RESULTS.

Winds rather Variable, but for the most part Northerly.

Barometer:	Greatest height	30·12 in.
	Least	29·15 in.
	Mean of the period	29·850 in.
Thermometer:	Greatest height	75°
	Least	35°
	Mean of the period	54·15°
	Mean of the hygrometer (for 20 days)	52°
	Rain	1·26 in.

The character of this period has been, on the whole, ungenial; though not one frosty night has occurred, yet cloudy weather, with blighting winds, mostly predominated; and the mean temperature turns out nearly 5° lower than that of the corresponding portion of 1815.

COLD IN NORTH AMERICA.

A letter from Quebec, dated June 10, says—"We had a fall of snow here on the 8th instant, several inches in depth. The weather is still cold, and it snows at intervals; the trees are not yet in bloom, and the oldest inhabitant does not remember such a season."

There has not been, for upwards of 40 years, so backward a season known in Nova Scotia as the present. Although now in the middle of June, but little vegetation has taken place, and there is scarcely any seed sown in the ground. Ice was seen on the morning of the 11th June, in the harbour, and a few days since snow was falling in different parts of the country..

From New York it is stated, under date of the 15th of June, that the cold weather, and even frosts, continued: in the upper part of the States, large icicles were pending, and the foliage of the forests was blasted by the frost.

(PUB. LEDGER.)

FROM A FRIEND.

Wilmington, State of Delaware, Fifth Month, 1817.

"Our winter has been extremely severe. It is supposed to have equalled in cold and duration the winter of 1779—80. Our thermometer during the first and second months was often near cypher, and many times several degrees below it. I think it was twice ten degrees below 0, in this town. In New Hampshire, the mercury froze in the bulb—the thermometer was consequently *thirty-eight* degrees below 0."

TABLE CXX.

	1816.		Wind.	Pressure.		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
6th Mo.	L. Q.	June 17	SW	29·92	29·82	67°	48°	—	
		18	SW	29·88	29·79	71	53	36	
		19	W	29·96	29·88	69	47	—	
		20	N	29·96	29·95	74	55	25	
		21	NE	29·95	29·95	71	51	—	
		22	NE	29·95	29·94	78	53	21	—
		23	SW	29·85	29·82	69	50	—	1·06
		24	NW	29·97	29·85	63	48	—	
	New M.	25	NE	29·97	29·86	73	56	37	
		26	Var.	29·60	29·54	70	54	—	2·05
		27	NE	30·00	29·60	63	50	—	
		28	NW	30·07	30·00	69	47	—	
		29	Var.	30·08	29·90	78	58	39	
		30	Var.	29·90	29·76	76	53	16	19
7th Mo.		July 1	NW	29·80	29·75	63	51	—	
		2	SW	29·84	29·80	73	53	—	—
	1st Q.	3	NW	29·86	29·84	64	50	—	13
		4	Var.	29·75	29·72	65	50	44	18
		5	Var.	29·88	29·75	66	46	—	
		6	Var.	29·89	29·75	69	56	—	—
		7	S	29·75	29·70	69	52	—	—
		8	S	29·70	29·69	70	52	45	26
	Full M.	9	SW	29·69	29·66	70	51	—	—
		10	SW	29·66	29·63	73	51	—	05
		11	NW	29·72	29·66	66	54	—	—
		12	NW	29·90	29·72	65	48	63	—
		13	NW	29·94	29·90	67	49	—	—
		14	SW	29·90	29·69	65	58	—	32
		15	SW	29·69	29·68	71	52	—	12
		16	Var.	29·69	29·66	63	52	36	77
				30·07	29·54	78	46	3·62	5·13

Notes.—Sixth Mo. 23. Cloudy morning: showery day: evening cold. 24. Cloudy morning: a strong cold wind from the NW. 26. The early part of the morning was fine: wind NE: changed to SW between 10 and 11, and began to rain, which continued without intermission all day: in the evening and night, was extremely heavy. 27. Morning very much overcast: the rain fallen from nine yesterday morning to nine this morning amounts to 2·95 inches, a very unusual quantity for the neighbourhood of London. 29, 30. Foggy mornings: overcast.

Seventh Mo. 1. A *Stratus* on the marshes at night. 2. A little

NOTES, &c. *(continued).*

rain about 10 p.m. 4. Showery day: some hail about 3 p.m.: wind variable, chiefly SW. 5. Showery morning: the day fine. 6. Morning overcast: heavy dew. 8. Showery morning: fine day: a heavy shower of rain between 9 and 10 p.m. 10. Showery morning: fine afternoon. 12. Cloudy morning: squally afternoon. 13. A heavy shower of rain about 10 p.m. 14. A gentle rain nearly all the day. 15. Rainy morning: showery day. 16. Very rainy day.

RESULTS.

Winds Variable: for the most part Westerly.

Barometer:	Greatest height	30·07 in.
	Least	29·54 in.
	Mean of the period	29·816 in.
Thermometer:	Greatest height	78°
	Least	46°
	Mean of the period	60·3°
Evaporation		3·62 in.
Rain		5·13 in.

WHIRLWIND.

June 25.—At two o'clock, being a still sultry day, a whirlwind passed over the nursery ground of Mr. Henderson, in the Edgeware-road, which lifted seven lights from the green-houses and carried them to the height of the highest elm-trees; each of the lights weighs 50 or 60 pounds at least. At the same time two garden mats were carried to an immense height, so that the eye could not distinguish them.

SNOW REMAINING ON THE MOUNTAINS.

The *Kendal Chronicle* of July 4, says—"A traveller, who has visited the top of Helvellyn this day, brought to the office a lump of snow from that summit. The gentleman informs us, that he saw three or four patches of snow, varying in extent in different directions."

On a hill, the property of Sir A. Ramsey, in the parish of Fettercairn, at the distance of little more than twelve miles from the German Ocean, there was a remnant of a wreath of snow, which measured on the 5th July five feet deep and eighty yards in circumference.—(PUB. LEDGER.)

I may add to the above proofs of the coldness of the higher atmosphere during this summer, that in passing through Switzerland, I saw the snows of the preceding winter lying in very large masses, in hollows on the chain of the *Jura*, and on the *Mole* near Geneva, from whence they usually vanish in summer; and this at a time when the new snows had already begun to fall on the same summits.

TABLE CXXI.

	1816.		Wind.	Pressure,		Temp.		Evap.	Rain, &c.
				Max.	Min.	Max.	Min.		
7th Mo.	L. Q.	July 17	Var.	29·66	29·48	67°	50°	—	11
		18	SW	29·56	29·48	66	51	—	—
		19	SE	29·75	29·55	70	58	—	21
		20	SW	29·76	29·57	81	65	66	—
		21	SW	29·78	29·59	70	54	—	—
		22	SW	29·79	29·65	70	58	—	32
		23	SW	29·65	29·65	73	55	—	—
	New M.	24	Var.	29·66	29·66	64	52	59	45
		25	NW	29·86	29·66	65	54	—	05
		26	NW	29·95	29·86	68	53	—	—
		27	NW	29·96	29·80	64	53	26	—
		28	NW	29·80	29·74	64	46	—	
		29	Var.	29·74	29·63	63	45	—	
		30	NW	29·63	29·55	64	41	25	—
	1st Q.	31	NE	29·65	29·54	65	48	10	03
8th Mo.		Aug. 1	NW	29·80	29·65	63	49	—	—
		2	W	29·85	29·80	67	51	—	27
		3	SW	29·88	29·85	68	49	41	
		4	SW	29·88	29·85	69	47	—	
		5	NW	29·95	29·80	70	51	—	51
		6	SW	29·97	29·88	68	57	28	03
		7	SW	29·88	29·79	70	57	—	—
	Full M.	8	SW	29·79	29·77	74	55	—	—
		9	SW	29·98	29·79	67	53	42	—
		10	NW	30·06	29·98	65	57	—	—
		11	SW	30·06	30·06	70	57	—	—
		12	NW	30·06	30·00	67	56	35	26
		13	SW	30·00	29·80	66	52	—	
		14	SE	29·80	29·58	68	58	—	08
		15	SE	29·59	29·53	71	56	25	09
				30·06	29·48	81	41	3·57	2·41

NOTES.—Seventh Mo. 18. Squally day. 19. Rainy morning: very boisterous wind all day, with showers. 20. Fine morning. 21. Showery day: a strong breeze from the SW. 24. Wind variable: very rainy day: some thunder in the afternoon: a *Stratus* on the marshes at night. 25. Foggy morning: a *Stratus* on the marshes at night. 30. A heavy shower of rain between 1 and 2 p. m.: some hail. 31. Very foggy morning: a thunder storm in the evening.

Eighth Mo. 2. Showery day. 5. Foggy morning: trees dripping: some thunder in the afternoon: very rainy night.

Notes, &c. *(continued).*

RESULTS.

Winds Variable: chiefly SW and NW.

Barometer:	Greatest height	30·06 in.
	Least	29·48 in.
	Mean of the period	29·771 in.
Thermometer:	Greatest height	81°
	Least	41°
	Mean of the period	60·4°
Evaporation		3.57 in.
Rain		2·41 in.

Storms, &c.

Our naval column this day bears the aspect of winter—strong gales, ships on shore, and loss of anchors, are rather unusual in the month of July.
(Pub. Ledger, *July* 24.)

From all parts of the country we hear of damage done by the late storms, and floods occasioned by the heavy rains.—(Pub. Ledger, *July* 26.)

An earthquake was felt at Martinique on the 15th of August, which lasted a considerable time, and being unusually severe, excited great alarm among the inhabitants.—(Pub. Ledger.)

Earthquake in Scotland.

The letters and papers received from the North bring accounts of this phenomenon, so uncommon in our country. The shock appears to have extended over the counties of Ross, Inverness, Moray, Banff, Aberdeen, Kincardine, Forfar, Perth, and Fife; and was indistinctly felt in Edinburgh and Glasgow. By all accounts, there has been no loss of lives, although considerable damage to property. The following is an extract of a letter from Inverness, dated August 14:—" Last night, exactly a quarter before 11 o'clock, the town of Inverness and the surrounding country was fearfully shook by an earthquake. We fled to the street, where we found almost every inhabitant; women and children screaming, and a very considerable portion of them naked. Many fled to the fields, and there remained for the greater part of the night. Chimney tops were thrown down or damaged in every quarter of the town. The Mason Lodge, occupied as an hotel, was rent from top to bottom, the north stalk of the chimney partly thrown down—one of the coping stones, weighing, I should think, from 50lb. to 60lb. was thrown to the other side of the street, a distance not less than 60 feet. The spire of the steeple, which I think one of the handsomest in Scotland, has been seriously injured, and must in part be taken down. The spire is an octagon; and within five or six feet of the top, the angles of the octagon are turned nearly to the middle of the square or flat side of the octagon, immediately under it. Notwithstanding the vast quantities of stones and bricks that have been thrown from such a height, not one person has received any hurt. I have only further to remark, that it was not attended with any of those phenomena that have been said to accompany earthquakes. The day had been beautiful and serene, and still continues so; no agitation or rising was observable in the river. It has been frequently observed, that in countries subject to these awful visitations, the mercury suddenly falls in the barometer: this I instantly attended to, but no alteration whatever took place."

See also a most circumstantial account of this earthquake, certainly one of the most violent on record in this island, communicated to Dr. Thomson, by Tho. Lauder Dick, Esq., in the Annals of Philosophy, vol. viii. p. 364, &c.

TABLE CXXII.

	1816.		Wind.	Pressure,		Temp.		Hygr. at 9 a. m.	Rain, &c.
				Max.	Min.	Max.	Min.		
8th Mo.	L. Q.	Aug. 16	Var.	29·84	29·59	65°	52°		—
		17	NW	29·98	29·84	61	49		21
		18	NW	30·15	29·98	62	51		—
		19	NW	30·16	30·10	67	55		13
		20	N	30·18	30·10	64	42		—
		21	N	30·18	30·14	66	50		—
		22	NW	30·14	30·10	68	53		
	New M.	23	NW	30·10	30·10	66	56		—
		24	NE	30·18	30·10	70	45		—
		25	NE	30·20	30·18	69	44		
		26	NE	30·18	30·15	67	47		
		27	E	30·19	30·15	66	44		
		28	E	30·19	30·17	70	46		
	1st Q.	29	NW	30·17	29·95	64	52		
		30	NW	29·95	29·36	61	53		23
		31	SE	29·46	29·30	59	46		1·09
9th Mo.		Sept. 1		29·57	29·22	49	40		92
		2	NW	29·67	29·57	55	30!		
		3	SW	29·67	29·33	56	43		—
		4	NW	29·49	29·31	57	37	66	—
		5	W	29·86	29·49	60	40	73	18
	Full M.	6	SW	29·86	29·79	61	50	75	
		7	W	29·79	29·77	67	52	62	
		8	SW	29·77	29·65	65	47	52	
		9	SW	29·48	29·38	60	54	77	55
		10	SW	29·80	29·77	64	47	60	18
		11	W	29·93	29·80	65	42	49	
		12	SW	30·13	29·93	65	41	70	
		13		30·13	29·99	65	55	70	—
				30·20	29·22	70	30		3·49

NOTES.—Eighth Mo. 19. Clear morning. 23. A little rain, evening. 24. Cloudy morning: smart shower at noon; a considerable appearance for thunder, evening. 25. *Stratus:* fine sunset. 26. Much dew, a. m.: cloudy. 28. Foggy morning: fair: *Stratus*. 29. Very foggy: fair. 30. Cloudy morning. 31. Wet morning: stormy night, with heavy rain.

Ninth Mo. (1. This was a very wet day at *Paris*.) 2. Hoar frost this morning: there is said to have been thick ice formed in several exposed situations. 3. Rain, with much wind in the night. 4. A hard shower of hail, followed by rain about noon. 5. Wet morning;

fair day after. 6. Cloudy a. m.: misty to the S: overcast day. 7. Maximum of temperature at 9 a. m.: fair day. 8. Fair: wind rising at SW in the evening, and *Nimbi* about. 9. It began to rain about 7 a. m. and continued till 3 p. m.: after which a very stormy night; the lower clouds moving much faster than the higher. 10. Fair day. 11. Much dew: fair: *Cirrocumulus* for two days past. 12. Much dew: fair. 13. Dew: misty a. m.: a few drops at midday, after much cloud and wind: the sky at sunset appeared to be clearing gradually.

RESULTS.

Winds Variable in the fore part, Westerly in the latter.

Barometer:	Greatest height	30·20 in.
	Least	29·22 in.
	Mean of the period	29·872 in.
Thermometer:	Greatest height	70°
	Least	30°
	Mean of the period	55·29°
Rain		3·49 in.

The two preceding periods, with so much of the present as is comprehended in the Eighth Month, apply in point of local circumstance, to the scite of the Laboratory, where the Observations were conducted by my friend and partner, John Gibson.

During a tour of nine weeks, in this interval, extending from Amsterdam to Geneva, I had ample occasion to witness the fact, that the excessive rains of this summer were not confined to our own islands, but took place over a great part of the continent of Europe. From the sources of the Rhine among the Alps, to its embouchure in the German ocean, and through a space twice or thrice as broad from east to west, the whole season presented a series of storms and inundations. Not meadows and villages alone, but portions of cities and large towns, lay long under water: dikes were broken, bridges blown up, the crops spoiled or carried off by torrents, and the vintage ruined by the want of sun to bring out and ripen the fruit.

While the middle of Europe was thus suffering from wet, the North for a time, and to a certain extent, was parched with drought, and public prayers appear to have been ordered, about the same time, at Dantzic and Riga for rain, and at Paris for sunshine! The probable natural causes of this unequal distribution may form a subject for discussion in another part of the work: it would in this place be premature. I have deduced the principal part of the evidence respecting it from numerous circumstantial accounts of the weather given in the public papers during the summer months.

TABLE CXXIII.

	1816.		Wind.	Pressure.		Temp.		Hygr. at 9 a. m.	Rain, &c.
				Max.	Min.	Max.	Min.		
9th Mo.	L. Q.	Sept. 14	SW	29·99	29·95	67°	48°	53	
		15	S	29·96	29·93	72	46	56	
		16	S	29·95	29·87	74	44	61	
		17	E	29·85	29·78	72	48	70	
		18	NE	30·02	29·78	70	47	72	—
		19	NE	30·02	29·98	60	43	59	
		20	E	29·98	29·64	62	40	53	
	New M.	21	SE	29·60	29·57	60	50	62	
		22	NE	29·74	29·60	66	48	63	
		23	N	29·73	29·64	63	51	66	
		24	S	29·97	29·73	61	51	72	0·13
		25	SE	30·09	29·97	67	42	59	
		26	N	30·12	30·06	64	48	72	—
		27	Var.	30·06	29·96	63	47	56	—
	Full M.	28	S	29·96	29·70	63	43	60	—
		29	SW	29·65	29·32	60	39	80	0·43
		30	SW	29·65	29·42	60	47	65	—
10th Mo.		Oct. 1	SW	29·58	29·55	63	46	89	66
		2	W	29·84	29·41	62	45	78	16
		3	Var.	29·84	29·80	58	49	65	16
		4	SW	29·82	29·80	66	53	85	—
		5	W	29·82	29·78	66	52	77	
	1st Q.	6	SE	29·78	29·74	68	56	71	0·54
		7	E	29·87	29·74	59	55	85	0·27
		8	E	29·95	29·87	66	54	80	
		9	E	29·98	29·95	63	55	65	—
		10	NW	29·95	29·92	65	51	64	
		11	NE	30·06	29·92	60	44	69	—
		12		30·06	30·04	57	47	73	—
		13		30·04	30·03	55	39	65	
				30·12	29·32	74	39	68	2·35

NOTES.—Ninth Mo. 14. The sky overcast, with numerous beds of *Cirrocumulus*, which at sunset changed to *Cirrostratus*, and became red. 15. An electrical smell a. m.: much dew: there appears to have been a *Stratus* in the night: serene day. 16. Much dew: large plumose *Cirri:* very fine. (A dreadful hurricane at *Guadaloupe.* Houses were levelled, plantations destroyed, and the soil driven about like dust in a whirlwind.) 17. Much dew: misty: fine day: in the evening a solitary *Cumulus* cloud in the W, spired up to inosculate with a *Cirrostratus* above it, a *Stratus* at the same time appearing in the meadows nearer to us: several discharges of lightning in the NW followed these appearances: the barometer, which had fallen a little, now rising. 18. Overcast day: a little rain perceptible in the evening. 19. Fair, with a grey sky, and a few distinct *Cirrostrati* beneath. 20. Grey sky a. m.: then sunshine, with a breeze. 21. Cloudy a. m.: some dripping at midday: fair evening. 22. Cloudy, in different modifications. 23. (At *Paris*, abundance of rain, with a SE wind.) 24. Showers: breeze at SE, evening: misty air. 25. Misty to S: fair, with *Cumulus* beneath *Cirrocumulus*: a *Stratus* at night. 26. Various modifications of cloud: some rain in the night. 27. *Cumulus* beneath *Cirrocumulus*. 28. Cloudy morning, the wind increasing from the westward: rain, midday: fair evening. 29. Wet morning: much wind at S till evening: stormy night. 30. Fair, with *Cirrostratus*: much wind in the night.

Tenth Mo. 1. Wet morning: much wind: lunar halo at night. 2. A plentiful dew: cloudy afterwards, with much wind: drizzling rain at intervals. 3. Cloudy a. m.: wind N: drizzling: in the night easterly, with misty air. 4. Overcast: small rain. 5. Fair. 6. Misty morning: much dew: *Cirrocumulus* in the superior stratum, as for some days past at intervals: rain p. m. and night. 7. At twenty minutes before one this morning a loud explosion of electricity, which kept the ground in a sensible tremor for several seconds: it was followed by thunder in long peals, and vivid lightning to the south and east for above an hour: also by much wind and rain: the day was cloudy and drizzling after. 8. Fair: mostly cloudy: *Stratus*. 9. Cloudy: breeze at E: large *Cirri*: a few drops of rain: a well-formed mushroom was brought me, which measured twelve inches over the crown, and weighed twenty ounces. 10. *Cirrocumulus* above *Cumulus*: calm. 11. Fair, save a few drops. 12. Cloudy. 13. Cloudy: breeze.

RESULTS.

Winds Variable.

Barometer:	Greatest height	30·12 in.
	Least	29·32 in.
	Mean of the period	29·840 in.
Thermometer:	Greatest height	74°
	Least	39°
	Mean of the period	55·9°
Mean of the hygrometer at 9 a. m.		68°
Rain		2·35 in.

Extract of a letter from Lloyd's Agent at Gottenburgh, dated the 2d Oct.—"On the 30th ult. at daylight, it came on to blow heavy at WSW; at nine it veered to the W, and blew a tremendous hurricane, which continued till almost 4 p. m. yesterday, when it moderated a little, but still blew a gale from the WNW. At five this morning it abated, and now blows only a fresh breeze."

TABLE CXXIV.

	1816.		Wind.	Pressure.		Temp.		Hygr. at 9 a. m.	Rain, &c.
				Max.	Min.	Max.	Min.		
10th Mo.	L. Q.	Oct. 14	SE	30·13	30·03	60°	38°	88	
		15	SE	30·13	29·99	57	41	82	
		16	SE	29·99	29·71	58	34	90	—
		17	Var.	29·72	29·69	52	35	93	12
		18	NW	29·85	29·72	53	30	77	
		19	NW	29·85	29·56	56	41	78	17
	New M.	20	W	29·58	29·52	50	39	60	
		21	Var.	29·63	29·61	49	40	55	—
		22	NW	29·89	29·63	54	30	86	5
		23	Var.	29·92	29·74	46	30	80	
		24	S	29·74	29·41	52	34	65	10
		25	SE	29·53	29·30	54	29	95	44
		26	SE	29·62	29·59	53	37	95	
	1st Q.	27	E	29·59	29·57	58	46	67	
		28	E	29·55	29·51	58	38	72	
		29	SE	29·51	29·15	56	42	88	—
		30	SE	29·16	29·09	57	42	90	37
		31	S	29·25	29·16	55	39	83	19
11th Mo.		Nov. 1	Var.	29·32	29·25	53	32	95	—
		2	S	29·22	29·17	47	35	94	81
		3	SW	29·63	29·22	48	36	85	11
		4	NE	29·63	29·62	51	44	86	19
	Full M.	5	SE	29·62	29·36	53	40	85	11
		6	Var.	29·33	29·29	50	36	90	—
		7	N	29·45	29·29	41	20		—
		8	SW	29·45	28·87	43	24	90	34
		9	SW	29·30	28·72	47	34	83	—
		10	NW	29·70	29·30	34	20	66	—
		11	Var.	29·23	29·03	44	26	73	54
				30·13	28·72	60	20	81	3·54

Notes.—Tenth Mo. 14. Much dew these two mornings past: gossamer. 15. Dew: somewhat misty air, with an electric odour: sunshine. 16. Misty: the trees dripping: calm: then sunshine, with a breeze at SE, and *Cumuli*, &c. 17. Morning overcast: rain by nine: rainbow: drips at intervals: fair. 18. Fair: a fine breeze through the day: twilight pale orange, with *Cirrostratus*. 19. Wind and rain in the night. 20. Cloudy day. 21. Obscurity to the S, indicating rain there: after dark, a flash of lightning to the SE, with a small meteor. 22. Rain a.m., succeeded by a fair day and night. 23. Hoar frost: clear a.m.: fine day. 24. Cloudy: windy at S: wet evening:

clear night. 25. Cloudy: windy at SE: very wet, p. m. 26. Misty morning: fair day. 27. Various clouds: fair. 28. Overcast, with *Cirrostratus*: clear night. 29. Very heavy dew: misty at night, with a *Nimbus* to the SW. 30. Rainy. 31. Misty: close, electric air: rain, p. m. and evening.

Eleventh Mo. 1. Misty a. m.: *Cumulostratus*, *Nimbus*: a little rain. 2. Misty morning: much rain this day and night: hail. 3. Misty a. m.: fair day: wet evening. 5. *Cumulostratus*: small rain. 6. *Nimbi*, with other clouds. 7. Snow this morning in the high lands: shower, with hail: snow again at night. 8. Very white frost: much smoke and cloud accumulated over the city: cloudy evening: the *Cirrostrati* appeared convergent to the rising moon: in the night the temperature, which had not passed 33° in the day, advanced to 43°, with much wind and rain from the southward. 9. Fair morning: squally, p. m.: after dark a small meteor and lightning to the S, in which direction *Nimbi* were visible at sunset. 10. Snowy morning: clear day: the hygrometer receded to 45°. 11. Clear, a. m.: wind NW: the ground crusted over with some snow, which fell last night: a bank of clouds in the SW, and some attenuated *Cirrostrati* aloft: at night rain: the wind violent at SW.

RESULTS.

Prevailing Winds SE and NW.

Barometer:	Greatest height	30·13 in.
	Least	28·72 in.
	Mean of the period	29·512 in.
Thermometer:	Greatest height	60°
	Least	20°
	Mean of the period	43·12°
Mean of the hygrometer at 9 a. m.		81°
Rain		3·54 in.

The barometer has been throughout unsteady, and its oscillations towards the end considerable, chiefly in depression. Eight days only were without rain.

The city of *Chester* on Wednesday (November 6), at noon, nearly enveloped in darkness; candles or lamps were obliged to be lighted in all the houses; this was succeeded by a slight shower. On Thursday successive falls of hail and rain took place; on Friday the frost was uncommonly severe, and on Sunday the snow which fell was above two feet deep in the streets.

An article from *Rochelle*, of the 14th November, states, that a tempest occurred on the French coast, in the night of the 11th and 12th instant, which occasioned many shipwrecks. Wind first N, then SSE.—(PAPERS.)

TABLE CXXV.

	1816.		Wind.	Pressure.		Temp.		Hygr. at 9 a. m.	Rain, &c.
				Max.	Min.	Max.	Min.		
11th Mo.	L. Q.	Nov. 12	NW	29·70	29·23	52°	38°	69	1
		13	W	29·68	29·64	56	39	75	
		14	W	29·64	29·44	45	27	63	
		15	NW	29·73	29·44	37	28	67	
		16	NW	30·04	29·73	38	28	65	
		17	SW	30·04	29·68	43	28	70	
		18	SW	29·75	29·68	47	32	90	7
	New M.	19	SW	29·93	29·75	46	39	93	
		20	S	30·00	29·97	51	37	95	
		21	SE	29·97	29·78	44	29	76	
		22	E	29·78	29·75	38	26	68	
		23	NE	29·89	29·74	33	17	67	
		24	NW	29·93	29·89	30	18	82	
		25	SE	29·93	29·88	40	25	90	—
	1st Q.	26	N	30·22	29·93	42	30	98	41
		27	W	30·30	30·22	45	32	96	
		28	NW	30·43	30·30	44	32	80	
		29	N	30·56	30·43	44	30	98	
		30	N	30·62	30·56	38	30	77	
12th Mo.		Dec. 1	NW	30·62	30·40	36	25	78	
		2	W	30·35	30·33	38	28	73	
		3	E	30·35	30·32	40	32	92	
	Full M.	4	E	30·32	30·08	42	36	91	
		5	SE	29·52	29·45	43	36	80	11
		6	SW	29·45	29·35	40	29	68	21
		7	SW	29·52	29·47	39	27	75	18
		8	SW	29·69	29·52	37	25	95	—
		9	W	29·55	29·46	42	27	95	17
		10	Var.	29·25	29·20	46	35	88	13
		11	NW	29·36	29·25	40	27	77	
				30·62	29·20	56	17	81	1·29

NOTES.—Eleventh Mo. 12. Windy. 13. Strong breeze: sunshine: much water out in the marshes. 14, 15. Breezy: sun and clouds. 16. Slight hoar frost. 17. *Cirrostrati* at a great elevation, in which a solar halo appeared for an hour or two, a. m. 18. Maximum temperature at 9 a. m.: windy: overcast: dripping forenoon. 19. The diurnal temperature disturbed by the solar eclipse (of which see the particulars in the Note). 20. Fair at 2 p. m.: *Cumulostrati* formed rapidly, and passed off at a great elevation, the wind veering S. 21. Fair: rather windy. 22. Cloudy a. m.: steady breeze: p. m. *Cumuli.* 23. Cloudy: steady breeze. 24. A serene sky. 25. Hoar frost, the third morning: overcast, with *Cirrostratus* and haze: rain at night. 26. Very misty a. m.: *Cirrostratus* sweeps the ground: rain. 27. Much *Cirrostratus*, especially to the N, of delicate texture: fair day. 28. The sky was so completely shrouded in a *Cirrostratus*, without the smallest opening to admit the sun's rays, that from nine to three the temperature did not ascend 2°: at sunset the sky cleared pretty suddenly, showing red *Cirri* above for a considerable time: the lower air, which had been transparent, now filled with mist. 29. Misty a. m.: calm: very bright sun at midday: lunar halo. 30. Hoar frost: breeze: very fine day.

Twelfth Mo. 1. Cloudy morning. 2. Lightly clouded. 3. Misty by *Cirrostratus*, soon after sunrise, during which a hoar frost formed: grey lofty sky. 4. Grey: little wind. 5. Idem: the lunar eclipse not visible for clouds: much wind, with rain after. 6. Fine. 7. Very fine day: but stormy at night. 8. Rain, the middle of the day: clear night. 9. Very white frost a. m., and rime on the shrubs: *Cirrostratus* floating at an elevation of two or three yards: the temperature rose quickly, and it rained, p. m. and night. 10. Fine day, with *Cirrus* and *Cirrostratus*: wet and stormy fore part of night. 11. Fair: at sunset a lofty and wide-spread *Nimbus* in the NW at 10 p. m.: a bright shooting star to the W: some large flakes of moist snow in the night.

RESULTS.

Winds Variable and moderate till after the Full Moon.

Barometer:	Greatest height	30·62 in.
	Least	29·20 in.
	Mean of the period	29·866 in.
Thermometer:	Greatest height	56°
	Least	17°
	Mean of the period	35·80°
	Mean of the hygrometer	81°
	Rain	1·29 in.

The rain fell at three distinct intervals, and chiefly by night, increasing greatly each time in quantity and continuance.

The atmosphere was so darkened yesterday morning in the vicinity of the metropolis by the thick fog, combined with smoke, that in some parts it appeared like a cloudy night. In the neighbourhood of Walworth and Camberwell it was so completely dark, that some of the coachmen driving stages were obliged to get down and lead their horses with a lantern.

(EVENING MAIL, *November* 27.)

The Inverness Journal, of November 17, says—"The winter has commenced with a severity almost beyond example: frost, rain, and snow have been almost incessant during the last week; and the greater proportion of corn, still uncut or in stooks, has suffered material injury. We regret to say, that several lives have been lost. A postboy of Bennet's, coming from the south, was obliged to leave his chaise on the road, and would have been lost but for the lights shown from the windows of Moyhall, which he reached nearly in a frozen state. *The obvious advantage of keeping lights, in stormy nights, in the windows of houses in the country, has thus been illustrated.*"

The winter, it appears, has set in with extreme severity in the interior of the Continent. At Augsburg, on the 19th of November, the eclipse of the sun was entirely obscured by a fall of snow, which commenced at seven o'clock in the morning, and lasted till noon. The ground was covered with snow a foot in depth. There was a great fall of snow at Frankfort on the same day, and Reaumur's thermometer showed at from 9 to 10 degrees below the freezing point.

METEOR.

The meteor lately seen at Glasgow, was also visible at Perth. It made its appearance in the SW, in the form of a small star, and gradually increased in magnitude till it reached the zenith, when it subtended an angle nearly equal to that of the full moon. In shape it resembled a paper kite. After passing the zenith, it again seemed to diminish in size, owing, no doubt, to its gradually receding from the observer, till its altitude was equal to about 30°, when it exploded like a sky-rocket. The report of the explosion, which is described as more tremendous than the noise of the loudest thunder, reached the ear about three minutes after the meteor vanished, so that it could not be less than 40 miles distant, and probably about 27 miles above the surface of the earth. From the various particulars collected concerning it, its diameter must have been about 240 yards. The light which it yielded was very considerable, being sufficient to render the smallest objects visible.—(PUB. LEDGER, *December* 12.)

Influence of a Solar Eclipse on the Diurnal Temperature.

The radiation from the sun is so manifestly the cause of a diurnal elevation of temperature on the earth, that in a considerable eclipse of that luminary we ought to expect some diminution, for the time, as well of its heating, as of its illuminating effect; but I do not know that any one has yet submitted this consequence to the test of observation by the thermometer. In determining to do this, I thought it right to have a proximate standard wherewith to compare the results I might obtain; and, therefore, although the day was by no means so favourable for the purpose as some preceding clear ones, I caused a number of observations to be taken of the progress of the diurnal temperature on the 18th of the eleventh month; and devoted the forenoon of the 19th, on which the eclipse of the sun took place, to a similar investigation by myself.

It will not be necessary very minutely to detail the observations of the 18th, which, as well as those during the eclipse, were made with the Six's thermometer which I constantly use. At 6 a. m. the thermometer stood at 40°, the sky being overcast with *Cirrostratus* clouds pretty close and dense, and a steady breeze blowing from SSW. At $6^h\ 45^m$, and for half an hour after, the temperature did not exceed 41°. At $7^h\ 45^m$, the sun being up, it was 42°; and from this time to 11^h it advanced (with some interruption, but no depression intervening) to 47°. In the interval before noon occurred a depression of *half a degree*, which being over, the temperature attained its maximum for the day, of 47·5°, at half-past twelve. During the time there fell about 0·07 inch of rain. The afternoon was fair, the temperature descended more rapidly than it had risen, and in the fore part of the night (as it appears) touched upon 32°.

A. M. *Eleventh Month*, 19. *Day of the Eclipse.*

h.	*m.*	*Ther.*	
6	30	— 35°	Temperature going down, having risen some degrees in the night: dawn of day perceptible: light *Cirrostratus* clouds, with a gentle breeze at SW. Barometer 29·68 in.
7	0	— 34·5	Day Breaks. Barometer 29·69 in.
7	20	— 34	Breeze increasing: a veil of clouds above, passing off with a definite edge to NE, but leaving detached streaks below.
7	42	— 33	Barometer 29·72 in. Sun not yet visible, being hid by a low mist.
8	0	— 34	The sun has been some time shining; but is now among thin streaks of cloud.
8	20	— 35	The sun among streaks of cloud, the disk scarcely visible; so that the commencement of the eclipse was not observed.
8	45	— 36	The sun still behind a light skreen of *Cirrostratus*, through the interstices of which the disk is at times distinctly seen eclipsed. The thermometer now ceases to rise.
8	55	—	The temperature now begins to decline, although there is less cloud than heretofore.
9	0	— 35·5	Barometer 29·75 in.: but hesitating, as if it would fall.
9	15	— 35	A somewhat thicker bed of cloud now coming over the sun increases the obscurity of the eclipse, which is yet not very considerable. There is perhaps as much *light* as when the sun was 20 min. high.

h.	*m.*	*Ther.*	
A. M.			
9	20	—	The thermometer now tends to rise again.
9	30	— 35·5°	Barometer 29·77 in. Cloudiness, by *Cirrostratus*, becoming general.
9	45	— 37	Eclipse visibly going off.
10	0	— 38	
10	15	— 39	The clouds again lighter.
10	30	— 40	Near the termination of the eclipse.
10	50	— 41	Barometer stationary: wind more to the W: the clouds thicken again.
11	5	— 42	
11	40	— 43	The clouds tend to form *Cumulostratus.*
P. M.			
12	20	— 45	Barometer rising.
1	30	— 45	In this interval the temperature has fallen half a degree, and risen again: as it did yesterday an hour earlier.
2	0	— 46	Temperature the same at this hour yesterday: cloudy.
3	0	— 46	Idem.
4	0	— 44	Barometer 29·80. No rain or strong wind has occurred during the observations.

The foregoing observations, I presume, will be found satisfactory. The temperature on this day was falling (as is commonly the case) before sunrise; presently after which it began to rise. This effect continued until a considerable portion of the sun's rays became intercepted, when it fell again, to near the middle of the eclipse (by my watch, which had not been adjusted), and in proportion as the latter went off, resumed its former movement, rose steadily, and attained its maximum at nearly the same degree as the day before, though later in the afternoon. Had the elevation proceeded from 8^{h} 45^{m} to 9^{h} 15^{m}, at the rate which it had assumed previous to this interval, the temperature at 9^{h} 15^{m}, instead of 35°, would have been 38°, and the progress of the diurnal elevation would have been still more uniform than the day before; which was to be expected from the greater uniformity of the sky. Now as the depression coincides sufficiently with the time of the sun's being under eclipse, and as no other disturbing cause is apparent, we may conclude that there resulted from this cause an interruption to the diurnal accumulation of heat at the place of observation, the amount of which, at six or eight feet from the surface, was equal to 3° of Fahrenheit's thermometer.

* * *

Since these Observations were published (in the Annals of Philosophy), I have met with the following passage, in an " Observation of the Solar Eclipse, April 1, 1764, by Dr. John Bevis." Philosophical Transactions, abridged, vol. xii. p. 113. "A full digit of the sun, or more, remained uneclipsed. The day-light was but inconsiderably diminished.—Fahrenheit's thermometer, placed without door to the north, stood at 50° when the eclipse began, *and fell but one division while it lasted.*"

Thus it appears that the thermometer has been heretofore resorted to on this occasion, and with a result which agrees very well with the present; the *depression* in our own case being *but one degree*, and the digits eclipsed nine.

In an *annular* eclipse of the sun observed at Edinburgh, by Colin Maclaurin, the middle of the time being about half-past 3 p. m., February 18, 1736–7, the observer remarks, "It was *very cold* at this time; a little thin *snow fell*, and some small pools of water in the college area, where there was no ice at two o'clock, *were frozen* at four.—Some curious gentlemen found that a common burning-glass, which kindled tinder at 3^h 59^m, and burned cloth at 4^h 8^m, had no effect during the annular appearance, and for some time before and after it." Idem. viii. 171.

The Moon on this occasion was scarcely to be discerned on the middle of the sun's disc, without the help of a dark glass: and with glasses it appeared much smaller than it should have done, their respective apparent diameters considered. The moon therefore stops fewer of the sun's rays than previous theory would suggest: or it collects and sends forward into the shadow a portion of those which would otherwise be only tangents to its orb. And in proportion as the illumination thus passes by the obstacle, so must the heat likewise. We want still the observations on a delicate thermometer during a *total* eclipse, to enable us to ascertain fully the power of the moon to intercept our heat.

It is somewhat curious, that in the observations of the Lunar period to which these notes are annexed, we have occasion to see, on two nearly successive days, the still greater effect of a complete skreen of cloud in stopping heat (Eleventh month, 28, *Note*), and of the smoke of the city in bringing on darkness.—See the note under the Results.

TABLE CXXVI.

	1816.		Wind.	Pressure.		Temp.		Hygr. at 9 a. m.	Rain, &c.
				Max.	Min.	Max.	Min.		
12th Mo.	L. Q.	Dec. 12	SW	29·00	28·65	47°	32°	95	40
		13	NW	29·35	29·00	43	28	70	—
		14	SW	28·82	28·53	47	33	76	52
		15	W	29·38	28·82	41	29	65	
		16	Var.	29·49	29·31	38	32	81	—
		17	Var.	29·28	29·22	49	35	97	20
		18	N	30·09	29·28	44	33	92	—
	New M.	19	N	30·47	30·09	36	25	70	—
		20	NE	30·47	30·35	32	22	74	
		21	N	30·35	30·07	28	14	85	
		22	Var.	30·15	30·00	31	17	75	
		23	SW	30·00	29·66	46	32	93	10
		24		29·72	29·53	48	33	83	
		25		29·72	29·38	48	35		
	1st Q.	26		29·42	29·27	50	33		37
		27	NW	29·78	29·42	43	27	90	—
		28	SW	29·40	29·30	49	32	90	18
		29	W	29·91	29·40	42	34	64	—
		30	SE	29·67	29·62	44	37	83	1·08
1817.		31	SW	29·67	29·51	48	39	99	9
1st Mo.		Jan. 1	S	29·35	29·30	48	36	88	35
		2	SW	29·49	29·45	44	32	90	72
	Full M.	3	S	29·63	29·20	48	31	94	—
		4	W	29·73	29·12	52	36	87	76
		5	W	29·73	29·52	44	32	72	70
		6	SW	30·25	29·52	45	33	80	14
		7	NW	30·42	30·25	38	22	65	
		8	N	30·53	30·43	30	26	90	
		9	E	30·58	30·53	30	21	82	
				30·58	28·53	52	14	83	5·61

Notes.—Twelfth Mo. 12. A wet day after a frosty night: the fore part of this night a violent storm of wind from the westward, the barometer rising fast. 13. Calm a. m., with a turbid sky: about noon a clap of thunder followed by some heavy sweeping hail. 14. The day fine, with *Cirrus:* after dark, the sky being suddenly overcast, the wind rose to an excessive degree of violence, with rain: the barometer had fallen since noon rapidly, the minimum (which is also the lowest point for the year) occurred very early in the morning of 15. During the storm in the night I was twice sensible of a tremor of the earth, distinct from the effects of the wind, and lasting perhaps a quarter of a minute. This I found reason to attribute to the shock of electrical discharges, as I found it had thundered twice about the time. 15. A gale a. m., with clouds: the day fine, and windy afterwards. 16. Hoar frost: fair, with *Cirrostratus:* at night a small meteor moving eastward. 17. Wet a. m.: the wind SE. 18. The wind passed by W to N, and gradually rose to a moderate gale: a few drops about noon. 19. Wind inclining to NE, a stiff breeze: snow p. m., part of which lay on the ground. 20. A brilliant evening twilight, which was reflected by a haze in the eastern sky. 22. Clear, save a little *Cirrostratus:* wind gentle and variable. 23. Wind rising a. m., the air turbid: sleet and rain followed, with a windy night. 25. Very fine day, the barometer nearly quiescent at 29·72 till evening: at night the wind rose, and was boisterous till the morning. 26. Much rain, in squalls, p. m.: a lunar corona at night. 27. *Nimbi:* the sun set fiery red, and much enlarged: windy. 28. Hoar frost: fair day: night very tempestuous, with rain from the southward, which began, with the rise of the barometer, at 10 p. m. 29. Wind, followed by *Cirrocumulus*, and a calm night. 30. A very wet day and night. 31. Misty: little wind.

1817. First Mo. 1. Windy: wet p. m. 2. Fair: at 5 p. m. hygrometer 65°, and the moon yellow: notwithstanding these indications, there fell much rain and snow after it in the night. 3. Fair day, save a slight shower: the night (after bright moonlight) very stormy, with rain. 4. Small driving rain: at night another gale of wind. 5—7. Much the same alternations as for several preceding days. 8. Very white rime: misty about noon: *Cirrostratus.* 9. The wind has now gained the E, having gradually shifted round by N: hoar frost: misty air.

RESULTS.

Barometer:	Greatest height	30·58 in.
	Least	28·53 in.
	Mean of the period	29·649 in.
Thermometer:	Greatest height	52°
	Least	14°
	Mean of the period	36·10°
Mean of the hygrometer		83°
Rain		5·61 in.

The wind, though chiefly westerly, has been very variable in direction, and equally so in force; presenting a succession of heavy gales, with intervals of frost and rain. This enormous quantity of rain, being *twice* as much as usually constitutes a *wet moon* in this part of the island, had the usual effect of inundating the low lands to a great extent, especially when met by the spring tide after the full. By a mark preserved at the Laboratory, however, I find that in the inundation of 1809, the river Lea rose 15 inches higher than on the present occasion.

HAMBURGH, *December* 13.—It has blown a hurricane here the whole of this day.

December 15.—A dreadful storm of wind and rain raged during the whole of last night in *Paris*, and did considerable damage.

January 2, 1817.—The accounts from Holland, of the effects of the weather, are deplorable: the winter season seems to have set in with heavy rains, and in consequence almost all the rivers and canals have overflowed their banks. (PAPERS.)

SOOT ON SNOW.

I have observed, that the flakes of soot which are deposited on the surface of snow, and remain there exposed to the sun's rays, disappear after some hours, leaving a cavity, the bottom of which is visible and clean. There is therefore probably a real oxidation of the carbon, after which it is dissolved in the water, in the way in which the colouring matter of cloth is destroyed in bleaching.

LEECHES UNHURT BY FROST.

Among the cold-blooded animals which resist the effects of a low temperature, we may reckon the common leech; which is otherwise interesting to the meteorologist, on account of its peculiar habits and movements under different states of the atmosphere. A group of these animals, which I left accidentally in a closet without a fire, during the frost of 1816, not only survived, but appeared to suffer no injury from being locked up in a mass of ice for many days.

END OF THE FIRST VOLUME.

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New Bridge-street, London.

THE

CLIMATE OF LONDON,

DEDUCED FROM

Meteorological Observations,

MADE AT DIFFERENT PLACES

IN THE

NEIGHBOURHOOD OF THE METROPOLIS.

By LUKE HOWARD.

IN TWO VOLUMES.

VOL. II.

Containing (besides a Preface to the second volume) the remainder of the Series of Observations, up to Midsummer 1819: an Account of the Climate, under the heads of *Temperature*, Barometrical *Pressure*, *Winds*, *Evaporation*, *Moisture* by the Hygrometer, *Rain*, *Lunar periods*: with a *Summary* of Results, in the order of the seasons; *General Tables*; and a copious *Index*.

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PREFACE TO THE SECOND VOLUME.

The Map of my subject being at length delineated, the reader has it in his power to survey it; which he may do either in detail, in the several divisions of *Temperature,* &c. which follow, or first as a whole, in the *Summary,* where it is treated in the order of the months and seasons. On turning over the work now that it is about to be completed at press, I am sensible of some imperfections in the arrangement; which might have been made more easy for the reader, and the text less interrupted by results in figures, had the whole been reserved, till now, unprinted. The few points of theory which I have introduced here and there, might likewise have been embodied in a preliminary dissertation; the want of which will be scarcely supplied, to some readers, by the summary above mentioned. My principal apology must lie, in the want of a good model, for a design so nearly novel in character: to which may be added a strong inducement to print the several parts, as they were digested, for the sake of easy reference. In attempting to reduce to some sort of method the great mass of observations before me, I was not seldom in the case of the traveller in a South American forest, who is obliged, even where others have gone before him, to cut his way at every step through a tangled thicket. If the *vista* be in any degree thus opened, those who may follow will scarcely grudge the labour of smoothing asperities, filling up chasms, and making plain the road to the science. With regard to mathematical discussions, with which it would have been an easy task to some, to have interspersed the work, I think it right to avow, that a limited education in that branch of science has left me unqualified to furnish them: and possibly, to men capable of applying them to the test of sound theory, the simple *data* derived from observation may prove as acceptable, as a splendid series of ready-made *demonstrations*. One thing the reader may rely on—that much care has been exercised in the plain calculations which were continually required to bring out my results. It may be proper also to remark, that for the convenience of those who may incline to take up the subject only in parts, the *Index* has been made copious and minute, to a degree which on any other consideration would have been quite superfluous.

The result of my experience is, on the whole, unfavourable to the opinion of a permanent change having taken place of later time, either for the better or the worse, in the Climate of this country. Our recollection of the weather, even at the distance of a few years, being very imperfect, we are apt to suppose that the seasons are not what they formerly were; while in fact, they are only going through a series of changes, such as we may have heretofore already witnessed, and forgotten. That the shorter periods of annual variation in the mean temperature, depth of rain, and other phenomena of the year, which will be found exhibited in this volume, may be only component parts of a larger cycle is, however, very possible. Otherwise, considering that the changes consequent on the clearing of woods, culture and drainage, with some other less obvious effects of an increased population, have probably by this time contributed their utmost to its improvement, I should venture to suppose, that our Climate is likely to remain for ages what it now is; and further that, in its great leading features, it differs little from what it was, when the present elevation of these islands above the sea was first established.

Having despatched the few remarks of this kind that were left for a preface, I may now claim the indulgence of the scientific reader for some thoughts of a more important nature. In the introduction to my earliest published observations (in 1807) I find the following remarks on the *end* and *object* of such enquiries. "Every correct register of the weather may be considered as intended for two purposes: first, as a daily record of the phenomena regarded as passing occurrences; secondly, as a continued notation of facts interesting to the philosopher, and from which he may deduce results, for the purpose of extending our knowledge of the œconomy of the seasons. This application of the subject it is desirable to encourage: for it cannot be doubted, that from views less limited we should draw conclusions less partial as to these changes, and instead of that scene of confusion, that domain of chance, which as commonly seen they present, we should discover a chain of causes and effects, demonstrative like the rest of creation, of the infinite wisdom and goodness of its Author." Athenæum, vol. i. p. 80. I should indeed regret the many hours of leisure, which I have since bestowed on this pursuit, could I not persuade myself, that these anticipations are likely to be in some measure fulfilled: that Meteorology will, by future observers, at least, be rescued from empirical mysteriousness, and the reproach of perpetual uncertainty; and will contribute its share to the support of a proposition, so well illustrated by some of the brightest names in science, that the "Almighty hand, that made the world of matter without form, hath ordered all things in measure and number and weight." Wisd. xi. 17, 20. Or, (to use more modern terms) that the Creator has, even in the course of the winds and the variations of the atmosphere, so adapted the means to the end, that amidst perpetual fluctuations, and occasional tremendous perturbations, the balance of the great machine is preserved, and its parts still move in harmony: each returning season verifying the assurance given to mankind after the deluge, "While the earth remaineth, seed-time and harvest, and cold and heat, and summer and winter, and day and night shall not cease." Gen. viii. 22.

I have occasionally observed with regret, in the writings of men of science, the continuance of a phraseology which I would gladly see exploded; which is unmeaning in itself, when strictly examined, but tends directly to evade or weaken the force of some important truths upon the mind—a mode of expression by which *Nature*, personified, is made to do every thing, while the Great Author of nature is never mentioned or alluded to. Surely no well informed mind can now imagine, that the chain of causes and effects, which we contemplate in Natural philosophy, could ever arrange and move itself; that the material world, in which we dwell, and over which we ourselves have such dominion, was originally produced without design or impulse—or that it is without beginning, and will never have an end!

The fading leaves of the tree which I now behold from my window will, in the course of a few weeks, have fallen to the earth, and their elements will have mingled in part with the soil, in part with the atmosphere. It is in the *nature* of vegetable matter thus to decay, when separated from the unknown principle which gave it organization. In a few months, other leaves, now concealed in the buds, together with other branches, will have unfolded themselves, adding to the total bulk of the root, stem, &c which now compose the tree. It is the *nature* of trees thus to increase in bulk, and extend their parts, by assimilating to themselves the elements contained in the earth and air. The tree with its new set of leaves will however be the same tree, though it will have changed a part of its substance: this, indeed, it has been doing ever since it first sprouted from the seed. The tree, then, was in the seed before it grew; it is a part of the *System of nature*; and the best account we can give of its origin in common language is, that it is the *nature* (natura: that which we expect *to be brought forth*) of the seed, thus to germinate in the moist earth, and of the tree, thus set growing, to increase to perfection; and lastly, to form in itself other seeds, capable under circumstances which will always occur in the course of *Nature* (natura rerum: that which from our knowledge of the earth and seasons, we expect will be the concurrence of events) to continue the species.

In this account of some familiar natural effects, the word *nature* has been used in its proper acceptation; in the sense which, unless I am greatly misled by its etymology, the inventor of the term intended for it. But were I now to proceed to say that all this takes place, because *Nature* thus works, or because *she* wills it, it would be but to run away from a plain and positive account of the matter, already on record, to a notion which is at best very obscure and indefinite. I might indeed imagine the existence of a power or principle, distinct from Omnipotence, and superseding the necessity of creation and Providence, subsisting in matter from all eternity, and manifesting itself in an infinite variety of forms and operations—I say I might choose to *imagine* this, but I could never demonstrate or render it probable. I should, then, have nothing solid to oppose to the positive authentic history of the matter, which is this, That "in the beginning" (of the system of nature as we now behold it) "GOD created the heaven and the earth"—that among other provisions for the use and sustenance of the future inhabitants, He caused the earth to bring forth "the tree yielding fruit, whose seed was in itself, after its kind." From which "beginning," by a succession of effects, which we can investigate and comprehend (though the created principle of vegetable life, immediately acting on matter to produce them be hidden from us) the "kind" or species has been continued to this day.

Divine revelation was alone competent to furnish us with just conceptions, on points of knowledge, neither attainable by the observation of nature, nor demonstrable by just inference from its phenomena: and without this, it is difficult to conceive how the idea of a spiritual energy, pervading and governing matter, could ever have been formed by man. We have accordingly in the book of Genesis an account of the origin of Nature, which, while it stoops to the simplicity of the human mind, in its ignorance of physical science, is yet fraught with the substance of the sublimest truths that are attainable, in the sincere and disciplined pursuit of this knowledge. It is for us, then, who are privileged with the greater light, in addition to the better use of the less, consequent on the experience of ages, reverently to acknowledge, on proper occasions, HIM to whom we are indebted for both; rejecting the subterfuges formerly employed to serve the purposes of a refined and sceptical philosophy, by men who *felt* their ignorance, while they pleased themselves with a parade of words: men, whose business it seems to have been, not so much to discover Truth, as by placing things in every possible light, in speculation, to prepare a language for the use of those who should afterwards be permitted to unfold its mysteries. But even *they* did not always grovel thus—*Seneca* could say, "Nihil est aliud *Natura* quam DEUS, et divina quædam ratio, toti mundo et partibus ejus inserta." In which again (for Seneca was contemporary with *Paul*) we may trace the reflected image of revealed truth: "For the invisible things of Him from the creation of the world are clearly seen, being understood by the things that are made—even His Eternal power and Godhead." Rom. i. 20.

The penmen of Holy Scripture were not qualified to instruct mankind in natural philosophy—nor was this *their* business: but to inculcate the more simple and important truths of Divine origin. They teach *Wisdom:* and while they do this, they often allude to creation, to Providence and nature, in terms worthy of their inspiration, and of the subject. The latter part of the Book of *Job*, in particular, abounds in these allusions: with one of which, appropriate to our subject, I shall close these remarks; "Whence then cometh Wisdom, and where is the place of understanding?—God understandeth the way thereof, and he knoweth the place thereof: For he looketh to the ends of the earth and seeth under the whole heaven; to make the weight for the winds; and he weigheth the waters by measure.—When he made a decree for the rain, and a way for the lightning of the thunder: then did he see it and number it; he prepared it, yea searched it out. And unto man he said, Behold, the fear of the Lord, that is Wisdom, and to depart from evil is understanding." Job xxviii. 20, 23—28.

L. H.

Tottenham, Tenth Mo. 25th, 1820.

ERRATA ET CORRIGENDA.

Vol. I. Int. p. vii, line 12 from bottom, *an* read *on*.
Tab. 2. Dec. 19. B, 39·61 read 29·61.
14. Dec. 9. B, 21·76 read 29·76.
20. May 31. T, 87—59: doubtful, if not 82—50.
29. Fourth line of additional notes: *adjoing*, read *adjoining*.
52. Jan. 16. T, 53 read 33.
94. second page of notes line 5 from bottom, *expanded* read *expended*.
120. First page, line 4 from bottom, 2·95 read 2·05.
122. Under Results, *scite* read *site*.
123. The marks, Full M. and 1st Q. are transposed.

Vol. II. Page 4. Feb. 8 Rain 0 01 *omitted*
91. line 6 from bottom, S and SE, *read* E and NE.
98. line 22, *read*, in one (of) which, &c.
170. line 5 from bottom; an, *read* and.

In Table C. Dec. 1814. 29·25 S *read* 28·94 SE
In Table D. Apr. 1811, N—E 16 *read* 6.
June 1810, Var. 3 *read* 8.
Nov. 1811, —— 2 *read* 1.
Dec. 1812, E—S, 1·0 *read* 10.
In Table F. period 130, 39·03 *read* 30·03.

In the circle of mean temperature, Plates I. and II, October 7 rises to 56·27°—*read* 53·77°; in consequence of the correction of an error in the Table, page 143, discovered after the plates were struck off.

Directions to the Binder.

The two circular diagrams to precede the Title page, the *coloured* one facing it.

The plate containing Fig. 7 and Fig. 8 to face page 144.
Plate 4 to face page 230.
5 to face page 232.
6 to face page 256.
Tables A. B. C. D. E. F. G. H. to follow page 346.

Meteorological Observations

MADE AT

TOTTENHAM, NEAR LONDON,

IN THE YEARS

1817, 1818, 1819.

(First Published Monthly in Thomson's Annals of Philosophy).

TABLE CXXVII.

	1817.		Wind.	Pressure.		Temp.		Hygr. at 9a.m.	Rain, &c.
				Max.	Min.	Max.	Min.		
1st Mo.	L. Q.	Jan. 10	Var.	30·58	30·40	30	20	82	
		11	E	30·40	30·11	33	25	95	
		12	SW	30·11	29·73	37	32		
		13	S	29·73	29·47	38	32		5
		14	Var.	29·47	28·90	39	27		—
		15	Var.	29·31	28·75	33	19		—
		16	SW	29·31	28·83	39	24		98
	New M.	17		29·00	28·83	42	37		7
		18	S	29·03	28·99	45	37		
		19	S	28·99	28·79	45	41	58	7
		20	SW	29·42	28·79	45	31	66	—
		21	SW	29·81	29·71	44	31	77	—
		22	SW	29·80	29·79	48	44	80	9
		23	SW	30·12	29·80	52	45	78	—
		24	SW	30·25	30·12	50	45	87	—
	1st Q.	25	SW	30·25	30·16	52	45	78	—
		26	SW	30·26	30·10	46	39	76	
		27	Var.	30·38	30·31	50	39	92	6
		28	E	30·25	30·22	43	40	70	—
		29	Var.	30·29	30·24	47	37	75	—
		30	N	30·37	30·20	51	40	96	
		31	NW	30·46	30·33	52	32	80	
2d Mo.		Feb. 1	NW	30·44	30·41	49	34	75	
	Full M.	2	W	30·41	30·27	45	37	92	
		3	SW	30·27	29·95	41	38	70	
		4	SW	29·69	29·50	43	35	57	2
		5	NW	29·90	29·69	50	38	73	4
		6	W	30·09	29·90	54	40	62	
		7	W	30·21	30·09	51	42	63	
				30.58	28.79	54	19	76	1·38

Notes.—First Mo. 10. Fair: hoar frost: misty. 11. Much rime: very red *Cirrostrati* at sun-rise: in the course of the day the rime mostly came off the trees, with a SW wind. 12. Grey lofty sky: *Cirrocumulus* p. m. 13. Misty: some rain after dark. 14. Clear, a. m. with *Cirrostratus* to S: from whence afterwards came on cloudiness. 15. A considerable fall of snow from SE, followed by sleet: snow at intervals, with a moderate breeze: clear frost at night. 16. Misty, gloomy, a. m. the wind very light, S: then a steady breeze, SW, and decided thaw, with much sleet and rain: the product of the rain-guage is that of the guage at the laboratory, my own having been accidentally overfilled. 17. The wind, for the first time in this period, blew a moderate gale in the night. 18. Fair day: somewhat windy night. 19. Fair: the wind E, with a lofty overcast sky, and much *scud:* at noon an electric-looking compound state of the clouds: after dark, rain from the southward, and a hard gale by morning. 20. Fine day: rain after dark; windy night. 21. Very fine day: a stiff breeze, with summer-like clouds in a blue sky: *Cirrostratus* at sun-set, and a lunar corona: windy night, and a dash of rain towards morning. 22. Drizzling at intervals: a gale at night. 23. Windy: a little rain, p. m.: at night a moderate gale. 24. *Cirrocumuli*, a. m. well formed from plumose *Cirri:* afterwards a pretty sudden obscuration, and some dripping. 25. Overcast: misty: a very little rain. 26. Ten minutes' sun about noon: the blackbird and robin sing much. 27. Misty and cloudy, as heretofore: at night the wind E, with moonlight and flying clouds. 28, a. m. Small rain: gloomy. 29. *Cumulostratus:* some sun at mid-day: at night wind N, with a veil of *Cirrostratus.* 31. Misty morning, followed by a very fine day, with *Cirrus* and *Cirrocumulus:* the hygrometer receded to 52°.

Second Mo. 1. Hoar frost: a fine day with a gradation of clouds from *Cirrus* to *Cumulostratus*, ending in an overcast sky. 2. Grey sky. 3. Misty; cloudy. 4. *Cumulus* and sunshine: at evening, thick to the SW: the wind rose to a moderate gale, with a shower. 5, a. m. High wind and clouds: dripping at night. 6. *Cirrostratus:* windy. 7. A fine sky of *Cirrocumulus:* windy, especially at night. The surface is considerably dried of late, and the roads tend to be dusty.

RESULTS.

Winds, with little exception, westerly: from the new moon to the first quarter, a SW wind, which was uniformly moderate by day, and increased in force in the night.

Barometer:	Greatest height	30·58 in.
	Least	28·79 in.
	Mean of the period	29·846 in.
Thermometer:	Greatest height	54°
	Least	19°
	Mean of the period	40·03°
Mean of the hygrometer		76°
Rain		1·38 in.

The hygrometer having undergone some repair, was exposed (after adjustment) for 24 hours before the observation of the 19th, which is probably, therefore, accurate. It appears that on this day there was a tremendous gale on the coasts of Devon and Cornwall, which did much damage, particularly at Plymouth.

Paris, Jan. 23.—A storm of wind and rain was experienced on the 15th inst. at Niort, which did great damage to the surrounding country.

On the 29th of January a mist prevailed at Naples, so dense as to produce a darkness of several hours. This is a rare occurrence in that delicious climate.—(PAPERS).

TABLE CXXVIII.

	1817.		Wind.	Pressure.		Temp.		Hygr. at9a.m.	Rain, &c.
				Max.	Min.	Max	Min.		
2d Mo.	L. Q.	Feb. 8	NW	30·27	30·21	50°	43	60	
		9	NW	30·29	30·10	51	39	61	
		10	Var.	30·10	29·80	50	33	77	—
		11	Var.	30·00	29·38	41	28	63	34
		12	NW	29·77	29·38	46	33	88	7
		13	SW	29·45	29·40	53	38	60	
		14	SW	29·75	29·43	53	35	83	42
		15	NW	29·66	29·43	50	35	53	3
	New M.	16	SW	29·90	29·66	47	32	79	—
		17	SW	30·02	29·90	55	45	73	—
		18	NW	30·09	30·02	54	34		3
		19	SW	30·15	29·75	46	38	63	—
		20	SW	29·50	29·38	48	33	63	6
		21	SW	29·58	29·36	44	34	60	—
		22	NW	29·90	29·58	47	33	65	
		23	W	29·79	29·68	49	39	53	4
	1st Q.	24	NW	29·95	29·79	48	38	63	
		25	W	29·69	29·62	51	40	62	11
		26	W	29·81	29·54	47	40	70	10
		27	NW	29·79	29·54	50	39	59	3
		28	SW	29·76	29·67	54	43	62	—
3d Mo.		March 1	W	29·68	29·47	53	32	58	
		2	SW	29·38	29·18	49	35	60	14
	Full M.	3	SW	29·14	28·84	50	36	59	50
		4	NW	29·24	29·14	45	30	60	—
		5	W	29·24	28·78	47	34	65	25
		6	W	29·22	28·78	43	28	62	
		7	W	29·10	28·98	46	34	63	—
		8	NW	29·40	29·10	43	28	60	55
		9	NW	29·91	29·40	45	29	61	—
				30·29	28·78	55	28	64	2.68

Notes.—Second Mo. 8. The light of an Aurora Borealis was very perceptible about ten, p. m. through the clouds which overspread the sky to the N: a windy night, with a little rain, followed. 9. Calm: grey sky, with the lighter modifications: at sun-set the clouds exhibited a splendid set of tints: close to the horizon was a clear space, lemon-coloured; above this, crimson lights, with shadows of grey and purple, in a variety of figures, streaked, waved, and clustered; of those in the E some were rose-red, others a tender green: a windy night ensued. 10. Fair: roads dusty. 11. Snow, a.m. with a gale at NE: in the night a southerly gale, with rain. 12. Showers. 13. Misty: small rain: windy. 14. a. m. *Cirrostratus:* gloomy: fair day, with clouds: windy night, with rain. 15. Windy night. 16. Windy: *Cumulus* beneath linear *Cirrus*, passing to *Cirrostratus*. 17. Cloudy: some rain morning and evening. 18. Dripping at intervals: windy. 19. a. m. calm: the dew drops frozen clear on the grass: a very fine day ensued, with *Cumuli*, and a breeze: windy night. 20. Much wind at S this evening. 21. Fleecy *Cumuli* beneath a hazy sky, with the lighter modifications: inosculation and *Nimbi* followed, with rain, sleet, and snow. 22. Fair: sun and clouds. 23. Windy: shower at night. 24. A bright haze at sun-rise and sun-set. 25. Fine day: some *Cirrostrati* assumed an arrangement not very frequent, of discs piled obliquely on each other. 26. *Cumulus*, capped with *Cirrostratus*: lunar corona. 27. After a gale through the night, rain before 9 a. m.: *Nimbi*, with hail, p. m.: at night large *Cirri*, very conspicuous by moonlight, stretching SE and NW. 28. Fair, save a light shower.

Third Mo. 1. Fair: windy. 2. A trace of solar halo about nine, in some *Cirri*, which soon subsiding went off with the wind to SE, grouping into forms like the crown of the *Nimbus: Cumulostrati* succeeded, which, p. m. gave place again to *Cirrose* obscuration, with a southerly gale and showers at night. 3 a. m. Overcast: p. m. steady rain: at sun-set a hazy sky, and much vapour: a highly rarefied *Cumulostratus* in the SE: a hard gale, with rain, at night. 4. Pale sky, a. m.: after which passing *Nimbi* and a little hail: calm night. 5. Hoar frost: fair, with *Cumulus* and *Cirrus*: evening, very large *Nimbi*: shooting stars: wind. 6. Wet morning: then fair, with various clouds: night frosty. 7. Pretty thick ice: fair day: rain at night. 8. Windy: snow in flakes about 1¼ inch diameter: sleet and rain: at noon large *Cumuli* in the N, passing to *Cumulostrati*, the sky above them being blue to 15° of the cyanometer: about two, p. m. a sudden shower of hail from a dense lofty *Nimbus*: the balls were opaque, in the form of a cone with a rounded base about ¼ inch diam., and composed entirely of striæ meeting at the apex of the cone: we have had similar hail repeatedly of late: frost (after rain) at night. 9. The lighter modifications prevailed, a. m. the *Cirri* pointing to NW: after these, lofty *Nimbi* formed in the midst of groups of *Cumulus*, letting fall light showers: the night was clear frost.

[illegible]

[illegible] several times [illegible]

[illegible] thunder-storms [illegible], as at Tunbridge, [illegible] evident [illegible]

[illegible] the night of [illegible] moderate

[illegible]

[illegible] was a hurricane [illegible]. The wind was [illegible]

[illegible] the whole of [illegible] thunder, [illegible] Alternate [illegible] height at

[illegible]

[illegible] beautiful *Aurora* [illegible], was distinctly [illegible] bright light [illegible], and, passing the [illegible] was the [illegible] was obscured by [illegible] less dis-

[illegible] strong gale [illegible] beautiful [illegible] the N. and NW., which [illegible] abeet [illegible] o'clock, part [illegible], and [illegible] brilliant [illegible] of the [illegible] —*E. Perry*, in

[illegible]

[illegible] terrible [illegible] The Kamg and [illegible] ago.

The alarm bell has frequently been sounded in the communes about Kehl, in order to collect people to strengthen the Rhine-dikes. Hitherto the danger has been averted; the bridge of boats at Kehl is still standing, and the communication between the two banks open: but from the left bank we have the most melancholy accounts. The rivers there have every where overflowed their banks. Great ravages have been caused about Strasburg by the Ill and Breusch. All the fields and gardens round Strasburg form one great lake. All the streets near the river are under water, and the communication kept up by boats. The Ill has done still greater damage about Schlettstadt. Several persons and a quantity of cattle have perished.—*Allgemeine Zeitung, March* 12.

Genoa, March 15.—They say here—there has been no winter south of the Alps, this year. As we passed through France, we often saw the country inundated from the snow and rains, but chiefly the latter. In Piedmont, the dust was the only thing that troubled us.

In addition to such notices as the above of the swollen state of the rivers in some parts of Swabia, France, &c. the foreign papers detail a number of accidents by *Avalanches* in the Tyrol, the Grisons, and Swisserland. The reader will perceive that the occurrence of this kind of disaster is perfectly consistent with that of inundation. The same excess of snow and rain, which loosens these overwhelming masses from their bed, must also tend to overcharge the natural channels, in its escape through the lower country. Whether the slight earthquakes which, it appears, have been frequent of late on the Continent, may not also contribute to the production of avalanches, is a question for observers on the spot to decide.

THE SPRING IN FRANCE.

Paris, March 2.—The drivers of the little carriages for Versailles call out '*There is still one seat left for Versailles; come and see the spring at Versailles.*' The crowd of curious persons going thither is very great. The fact, which gives occasion to this, is the fine sight presented by the trees in the great Park, which display a vegetation, such as is seen in the month of May. Several trees in the Park of Trianon are covered with new leaves; the hawthorns in the open air are loaded with flowers. May the hope, which this early spring gives us, not be destroyed by frosts in the month of May! The Chronicle of Bullinguer mentions, after a calamitous year, the summer of 1540. The fine weather and the heat lasted from the month of February to the 19th of September, and during all this period it rained but six times. At the end of May ripe cherries were eaten, and grapes in July; the 25th of June was the midst of the harvests; and at the beginning of September, the vintage was at its height. Bullinguer adds, that this year was equally remarkable for the extreme abundance of wine, corn, and all sorts of fruit.

Note.—Subsequent events have shewn that the writer of this was a year too early in anticipating a parallel to the summer of 1540: it occurred in 1818!

STATE OF THE WINDS TO THE SOUTHWARD.

About 40 sail of outward-bound vessels are lying at the Motherbank, Spithead, and Stokesbay, waiting a fair wind to proceed on their respective voyages: many of them have received their Custom-house clearances ten weeks. Though we have had such a continuance of westerly winds, yet it is stated by the master of a vessel from Teneriffe, that he experienced *nothing but northerly and easterly winds* on his voyage, until his arrival in Channel soundings. The Agricola, Captain Tabor, of and for New York, with passengers from Portsmouth, put into St. Helen's on Saturday, with the loss of her sails. She sailed 25 days since (having been previously detained there two months by contrary winds), and during that time she has never been able to get so far to the westward as Plymouth.—*P. Ledger, Mar.* 11.

TABLE CXXIX.

	1817.	Wind.	Pressure.		Temp.		Hygr.	Rain,
			Max.	Min.	Max.	Min.	at 9a.m.	&c.
3d Mo.	L. Q. March 10	NW	30·10	29·91	47	28	75	
	11	SW	30·10	29·94	53	39	66	—
	12	W	29·91	29·84	55	47	70	1
	13		30·15	29·91	55	42	65	
	14	NE	30·22	30·15	61	30	73	
	15	SE	30·22	30·16	50	27	70	
	16	E	30·23	30·16	49	27	82	
	New M. 17	SE	30·24	30·20	48	25	85	
	18	Var.	30·20	29·85	52	33	50	
	19	NW	29·75	29·74	47	27	52	
	20	N	29·88	29·75	34	24	47	
	21	N	29·90	29·86	39	17	59	
	22	SE	29·97	29·90	39	19	80	
	23	SW	29·92	29·88	46	24	58	—
	24	W	29·88	29·72	55	39	80	—
	25	Var.	29·85	29·72	58	34	74	7
	1st Q. 26	Var.	30·00	29·85	52	34	52	13
	27	Var.	30·05	29·92	44	27	62	
	28	SW	29·92	29·76	50	38	72	4
	29	W	29·99	29·76	55	45	60	—
	30	NW	30·23	29·99	59	39	50	
	31	NW	30·51	30·23	54	32	64	
4th Mo.	Full M. April 1	S	30·51	30·37	56	36	67	
	2	SE	30·37	30·27	58	33	50	
	3	E	30·33	30·27	60	37	65	
	4	NE	30·33	30·30	56	34	70	
	5	N	30·32	30·25	53	26	64	
	6	NE	30·43	30·32	50	37	52	
	7	E	30·37	30·20	52	30	60	
			30·51	29·72	60	17	64	0.25

Notes.—Third Mo. 10. Fine, with *Cumulostratus*. 11. A mist, probably from the Thames, there having been much *Cirrostratus* at sun-rise in the SE: cloudy, p. m. with a few drops. 12, a. m. *Cirrostratus* in flocks: at evening a slight shower, with wind. 13. Fair: overcast with *Cumulostratus*. 14. This morning at eight the wind sprang up at NE, a gentle breeze, which, being propagated upwards, carried a veil of *Cirrostratus* off to SW: in the evening the sun's disk was curiously disfigured by the intervention of *Cirrostrati*, with vapour: after being divided, and afterwards crossed as by belts of this cloud, the lower portion came out much extended horizontally, while the part yet obscured became somewhat conical upwards. 15. a. m. *Cirro-*

stratus: misty to SW, after which light breezes and general cloudiness. 16. Hoar frost: fair: wind SE a. m., NE p. m. 17. A dripping mist, after hoar frost: then *Cumulus*, and the wind S. 18. Hoar frost, misty morning, SE: clear day: p. m. the wind SW, a smart breeze: clouds after dark. 19. a. m. Wind SW: *Cumulus*, beneath *Cirrocumulus* and *Cirrostratus*: p. m. windy at NW: *Cumulostrati* and *Nimbi*, with a little hail. 20. A gale at NNW, tending continually to go to N: a very scanty snow at intervals. 21. Very fine: *Cumuli* prevailed, which evaporated at sun-set: the roads quite dusty: wind tending to E, a smart breeze: night calm. 22. Hoar frost: hygr. noted at eight a. m.: very light breeze. 23. Hoar frost: fine day: evening obscured by *Cirrostratus*, which descended from above. 24. Some drizzling rain this morning. 25. Hoar frost: rain: a hail shower: p. m. the wind NE. 26. a. m. Overcast with *Cirrostratus*: small rain, p. m. 27. Very fine day: wind a. m. NNE, with *Cumulus* and *Cirrostratus*. 28. Wind S, a. m. with *Cirrostratus*: drizzling rain. 29. Temp. 50° at nine, a. m.: windy at SW. 30. Very fine morning, with dew: *Cumulus* beneath *Cirrocumulus* and *Cirrostratus*: a few drops of rain: a small yellow lunar halo: much wind in the night. 31. Windy: *Cumulus* beneath large *Cirri*: a lunar halo, white and of large diameter.

Fourth Mo. 1, 2. Light driving mists, followed by fine days. 3. Hoar frost: rose-coloured *Cirri* at sun-set. 5. Cloudy: a few drops: misty night. 6. Hoar frost: *Cumulus*, with *Cirrocumulus*: windy. 7. Windy at SW by night, with mist.

RESULTS.

Winds for the most part light and variable, but on the whole Northerly.

Barometer:	Greatest height	30·51 in.
	Least	29.72 in.
	Mean of the period	30·07 in.
Thermometer:	Greatest height	60°
	Least	17°
	Mean of the period	41·5°
Mean of the hygrometer		64°
	Rain	0·25 in.

The change from the turbid Atlantic air, which had for many months been flowing over us, to a dry transparent medium, was, from the commencement of this period, strikingly obvious to the sense. The sun assumed a splendour, and the moon a brilliancy, to which the eye had been long unaccustomed, and distant objects seemed as it were restored to the landscape. The mean of the barometer is the highest that has occurred to me since the spring of 1813: the *ten* dry days about the commencement of the period were the first that had happened in strict succession for twelve months; and there has not fallen so little rain in any lunar period that I have registered since the beginning of 1810. The evaporation has doubtless been excessive, and I regret that I have kept no account of it: for the state of the hygrometer did not fully indicate the dryness of the air, on account of the misty mornings.

TABLE CXXX.

	1817.		Wind.	Pressure.		Temp.		Hygr. at9a.m.	Rain, &c.
				Max.	Min.	Max.	Min.		
4th Mo.	L Q.	April 8	Var.	30·20	29·89	58°	34°	59	1
		9	NE	29·97	29·89	46	28	46	—
		10	N	30·23	29·97	40	25	50	—
		11	NW	30·23	30·02	46	29	53	
		12	NW	30·01	29·96	49	39	63	
		13	NW	30·04	30·00	55	38	53	6
		14	NW	30·00	29·93	60	42	55	—
		15	NW	29·72	29·67	61	41	50	—
	New M.	16	N	30·11	29·72	48	32	52	2
		17	N	30·30	30·11	42	34	43	
		18	N	30·37	30·30	53	26	50	
		19	NE	30·32	30·30	55	40	42	
		20	NE	30·34	30·33	55	34	50	
		21	NE	30·34	30·27	59	32	46	
		22	SE	30·27	30·17	57	29	60	
		23	NE	30·20	30·17	50	27	59	3
	1st Q.	24	NE	30 20	30·14	52	35	52	2
		25	NE	30·14	30·12	44	36	46	
		26	NE	29·93	29·87	49	40	44	
		27	Var.	30·09	29·93	50	32	40	
		28	W	30·09	29·91	58	43	45	
		29	NW	29·91	29·70	48	37	47	—
		30	NE	29·81	29·69	50	39	55	·10
5th Mo.	Full M.	May 1	NE	29·93	29·81	48	34	50	
		2	NW	29·93	29·84	56	30	42	
		3	W	29·77	29·72	60	45	45	—
		4	NW	30·01	29·77	60	32	41	
		5	SW	30·06	29·95	64	35	48	
		6	N	30·16	30·06	64	36	34	
		7	SE	30·06	29·77	60	37	50	4
				30·37	29·67	64	25	49	0·28

NOTES.—Fourth Mo. 8. The wind was for some time at SW: rain in the night. 9. Cloudy, a.m.: a shower of driven granular snow in the night. 10. *Cumulostrati* and *Nimbi*, giving small quantities of snow. 11. *Cumulostratus*: windy. 12. Mostly overcast: very light rain at intervals. 13. Small rain, a.m.: fair, p.m. 14. A little light rain. 15. Fair: large plumose *Cirri* above *Cumuli*. 16. a.m. A strong gale from NW and N, with a shower and hail: rainbow: fair day after. 17. *Cumulostratus*: dark sky: windy. 18. *Cumulostratus*: the wind veers to NE and NW: calmer day. 19. The hygrometer noted at ten:

Cumulostrati prevailed, surmounted by the lighter modifications: windy: the part of the moon's disc in shade distinctly visible, and the light crescent very conspicuous in the evening: a small meteor passed to the NE. 20. a. m. Windy, not steady to NE: *Cumulostrati.* 21. a. m. *Cirri* pointing westward, with *Cumuli* beneath: afterwards an arrangement of this cloud in regular parallel streamers from NW to SE,, which became red at sun-set. 22. With the SE wind this morning the *swallows* appeared, but few in number, and flying feebly: a serene evening, after *Cumulus* and *Cumulostratus.* 23. Hoar frost early: cloudy: windy: a shower from NE, p.m.: clear evening: the hygrometer to-day receded to 32°, and the superior part of the clouds, after the rain, presented a configuration like the *pores of sponge*, which I have not observed before for some years. 24. *Cumulostratus*: windy: a shower at night. 25. a. m. Overcast: windy: *Cumulostratus.* 26. The same, the breeze growing stronger. 27, 28. Chiefly overcast with *Cumulostratus* and large *Cirrocumulus.* 29. The same, with *Cirrostratus:* a slight shower by night. 30. A moderate gale at NE, with showers and much cloud: *Nimbi:* a little hail.

Fifth Mo. 1. Cloudy: windy. 3. A slight shower in the night. 5. The hygrometer receded to 32°. 6. The wind went from N to E. 7. Wind SE: a breeze: very clear all day, and a full orange twilight: by six, a. m. the 8th, it was however SW, with a slight shower.

RESULTS.

Winds almost uniformly northerly, and moderate in force.

Barometer:	Greatest height	30·37 in.
	Least	29·67 in.
	Mean of the period	30·028 in.
Thermometer:	Greatest height	64°
	Least	25°
	Mean of the period	43·85°
Mean of the hygrometer		49°
	Rain	0·28 in.

Vegetation has been peculiarly slow during this period.

On the 19th of Third Month last I had an opportunity of observing that rare phenomenon the *Anthelion.* It was formed on the perpendicular part of a lofty dense *Cumulostratus*, which happened to present in the NE at near five, p. m. a surface directly opposed to the sun, reflecting *an image of the disk*, at the same apparent height from the horizon. In a few minutes, and almost as soon as I had satisfied myself of the fact, it was obliterated by a new protuberance in the cloud destroying the direct reflection. An Anthelion observed by Swinton near Oxford in 1762 is described, with a figure, in Vol. XI. of the Phil. Trans. Abridged, p. 532, to which the reader is referred; but in the present instance, the whole cloud being bright, the contrast between the general surface and the sun's image was probably less striking than in Swinton's observation.

TABLE CXXXI.

	1817.		Wind.	Pressure.		Temp.		Hygr.	Rain,
				Max.	Min.	Max.	Min.	at9a.m.	&c.
5th Mo.	L. Q.	May 8	Var.	29·72	29·68	72°	42°	49	8
		9	NE	29·68	29·49	54	37	59	
		10	SW	29·43	29·35	60	38	45.	—
		11	Var.	29·35	29·23		43	48	15
		12	W	29·63	29·23			45	—
		13	SW	29·63	29·59	59	34	58	13
		14	W	29·74	29·59			41	45
		15	SW	29·90	29·74	62	33	49	
	New M.	16	Var.	29·90	29·80	65	33	50	
		17	SW	29 80	29·55	67	39	42	1
		18	SE	29·43	29·36	72	44	53	11
		19	NE	29·46	29·43	53	38	67	—
		20	NE	29·42	29·34	52	43	80	—
		21	NE	29·42	29·40	48	38	59	—
		22	SW	29·42	29·40	57	40	50	1·44
		23	W	—	—	—	—		—
	1st Q.	24	NE	29·40	29·27	62	35	65	18
		25	SE	29·19	29·16	57	45	58	29
		26	E	29·37	29·17	63	41	44	
		27	NE	29·59	29·35	69	38	53	
		28	NE	29·59	29·56	59	47	77	
		29		29·80				51	—
	Full M.	30		29·90					23
		31		29.75	29·68	59	33	50	
6th Mo.		June 1	SW			63	42	41	
		2	W	29·64	29·58	64	46		
		3	W	29·59	29·45	64	52		
		4	W	29·99	29·45	65			
		5	SW	29·91	29·89	65	47	54	11
				29·99	29·16	72	33	54	3·18

Notes.—Fifth Mo. 8. *Cirrocumulus*, mixed with *Nimbi*, a.m. after which, the cloudiness becoming general, a thunder-storm ensued, soon after four, p.m.: it came from the SW, with the wind at SE. 9. Cold wind, a.m. with a general cloudiness. 10. Overcast, a.m. with *Cumulostratus*: a few drops of rain. 11. *Cumulus*, *Cumulostratus*, and *Nimbus*: the wind NW and SW: rain with wind at night from the southward. 12. a.m. A westerly gale. 13. Showery, with hail twice. 14. Showery: hail, pretty large, at noon from the southward. 15, 16. Fair. 17. A shower, p.m.—Travelling in the interval from the 13th to the 17th inclusive as far as Leeds, in Yorkshire, and home again, I found cloudiness from large *Cumuli*, &c. general, but met with very little rain. On the 15th, passing between Leeds and Pontefract, there was a fine display of *Nimbi*, one of which let fall a heavy shower on the latter place and its environs. On the 17th, after a deep orange tint in the morning twilight, the sun rose *red* behind a *Cirrostratus*; in emerging from which the brilliant part of the disc was divided by a well defined line from the lower and coloured portion. 18. Cloudy, a.m.: gentle rain, p.m. 19. Windy, cloudy, a.m. wet, p.m. 20, 21. Rainy. 22. Cloudy. 23. 24. Some showers: a *Stratus* at nine, p.m. the latter day. 25. Thunder at a distance: showers, a.m. 27. A thick fog at night, undoubtedly from a *Stratus*.

RESULTS.

Winds variable, but for the most part westerly.

Barometer:	Greatest height	29·99 in.
	Least	29·16 in.
	Mean of the period	29·533 in.
Thermometer:	Greatest height	72°
	Least	33°
	Mean of the period	50·70°
	Mean of the hygrometer	54°
	Rain	3·18 in.

I had anticipated a *third* dry period, similar to the two we had experienced, and expected that the rains would return after the summer solstice: in this I have been happily mistaken. In the beginning of the present period the weather took a new type with us, the westerly current coming in again, with some discharges of electricity, bringing rain, which gradually became more plentiful, and proved exceedingly seasonable. Vegetation has passed, in consequence, from a starved and backward state, to one of considerable luxuriance and promise. It is observable that the barometer during this period has scarcely passed the boundary of 30 inches in elevation, and has certainly not descended below 29 inches. The mean temperature, though 6° higher than that of the period immediately preceding, is low for the season.

GREAT RAIN AT STUTGARD.

Paris, June 5.—Letters from Stutgard, dated May 28th inform us, that on the 26th the rain began to fall in torrents, and did not cease for three days and three nights; all the rivers were overflowed, and it produced an inundation far surpassing any thing ever recollected in that country.

The lower part of the small town of Constatt, a league from Stutgard, was under water, and the suburbs were evacuated by the inhabitants. Several individuals and many animals were drowned at Constatt: on the evening of the 28th the rain ceased.—*Pub. Ledger.*

Note.—It is observable that this unusual fall of rain in a part of Germany 450 miles SE of the Thames, began at the precise time when after nine days of wet weather it became fair with us; and that during its continuance, with a sufficiently low state of the Barometer, *we* were without rain.

TABLE CXXXII.

	1817.		Wind.	Pressure.		Temp.		Hygr. at 9 a.m.	Rain, &c.
				Max.	Min.	Max.	Min.		
6th Mo.	L. Q.	June 6	SW	29·89	29·84	74	55	45	
		7	SW	29·84	29·64	77	51	50	
		8	SW	29·79	29·64	67	44	61	—
		9	SW	29·79	29·67	60	54	54	70
		10	NW	29·94	29·67	67	40	47	6
		11	SW	29·89	29·68	71	50	54	
		12	SE	29·68	29·52	—	—	54	
		13	Var.	29·37	29·17	65	48	48	39
	New M.	14	NW	30·05	29·37	61	43	41	1
		15	W	30·23	30·05	63	34	43	
		16	E	30·23	30·00	70	40	42	
		17	SE	30·00	29·62	76	50	42	
		18	SE	29·67	29·62	79	52	42	
		19	SE	29·75	29·67	83	53	48	
		20	SE	29·83	29·75	83	59	47	
		21	NE	30·00	29·83	86	59	51	
	1st Q.	22	NE	30·00	29·90	84	56	50	
		23	N	29·90	29·87	84	59		
		24	W	29·90	29·87	82	58	47	—
		25	W	29·92	29·80	77	52	61	
		26	W	29·80	29·55	76	58	42	—
		27	NE	29·65	29·50	83	56	43	—
	Full M.	28	W	29·92	29·65	72	45	42	—
		29	SW	29·92	29·65	74	55	40	1·07
		30	SW	29·77	29·65	68	44	39	—
7th Mo.		July 1	SE	29·65	29·37	60	55	51	
		2	SW	29·90	29·60	68	48	50	
		3	W	29·90	29·55	70	54	54	
		4	SW	29·55	29·48	68	51	44	
		5	NW	29·67	29·50	70	49		58
				30·23	29·17	86	34	47·5	2·81

Notes.—Sixth Mo. 7. Much *Cirrocumulus*, a. m. in beds at a considerable elevation: in the evening a group of thunder clouds in the S and SE, which passed, after a single peal of thunder, to the eastward. 8. Windy: light showers, a. m.: heavier rain, p. m. 9. Stormy wet day and night. 10. Showers: *Cumulostratus* at sun-set. 11. Fine morning. 13. Wet, blowing day: stormy night. 14. Much wind and cloud, a. m.: slight shower: evening more settled. 15. Windy at NW, a. m.: *Cumulus*, with *Cirrostratus*: *Cumulostratus*: fair: *Stratus* at night. 16. Fine: *Cirrus* at evening. 17. A *Stratus* visi-

ble at four, a. m.: very fine day: luminous twilight, with the moon conspicuous: *Cirri* after sun-set. 19. Hot sun-shine: fair. 20. Lightning this evening. 21. *Stratus* at night. 22. Continued thunder in the SE, p. m.. 23. Rather cloudy, a. m.: a fine breeze. 24. Morning cloudy, then fine: in the evening, heavy rain, with hail, thunder, and lightning: hygr. before the storm at 36°. 25. Cloudy morning. 26. Misty morning: drizzling rain, then fine. 27. A thunder storm between six and seven in the evening: very heavy rain, with thunder and lightning. A waterspout passed within view to the N, of which see the account annexed. 28. Heavy showers, evening. 29, 30. Cloudy, with showers.

Seventh Mo. 5. Thunder in a mass of clouds to the south and south-west: some rain with us.

RESULTS.

Winds variable.

Barometer:	**Greatest height**	**30·23 in.**
	Least	**29·17 in.**
	Mean of the period	**29·751 in.**
Thermometer:	**Greatest height**	**86°**
	Least	**34°**
	Mean of the period	**61·83**
Mean of the hygrometer		**47·5°**
	Rain	**2·81 in.**

A WATERSPOUT.

On the 27th of the sixth month, about seven in the evening, there occurred in our neighbourhood an undoubted exhibition of that rare spectacle (to observers on land)—the *waterspout.* I shall give the observations of two of our workmen at the Laboratory who saw it from Stratford, passing on their N horizon from NW to NE. I was absent myself in the West of England; but my friend John Gibson witnessed the latter part of the phenomenon.

The weather over head had been exceedingly dark and threatening, and there had been thunder and rain in that direction; but at the time of the observation a clear sky was discernible beneath the clouds. From a dense cloud, the base of which might be at an elevation of 20°, there issued suddenly a *descending cone*, which one of the observers compared to a steeple inverted: this returned back to the cloud: a second and a third followed, one of which came lower, with a considerable *perpendicular oscillation*, and at length *opened out* below;

and a *straight column*, which he compared to a dart, proceeded from its enlarged extremity to the earth, being visible also as a *denser body* pretty far up into the cloud. In a little time this cone also, losing its appendage, was drawn up again, and another or two, similar to the first mentioned, succeeding, closed the train of appearances, the whole having lasted about 15 minutes.

The course of this spout appears to have been over the country about Hampstead. In a communication, by another observer, to the Philanthropic Gazette, a person is stated to have been overtaken by it on Hampstead Heath, and to have been drenched by a fall of rain in very unusual torrents during its short passage. He conceived the spout to touch the top of the tree under which he had retired for shelter. The denser column seen by the observer at Stratford to proceed from the cloud admits of an explanation when connected with this fact. It was probably an extremely heavy shower, or rather *stream of water* (of small diameter compared with showers as they usually fall) generated in the axis of the cone of cloud by the strong electrical action which produced the latter, and serving ultimately as a conductor, through which the electricity rushed at once, and the equilibrium was so far restored as that a second discharge in this way could not be effected. Had it been at sea, the tendency of the superinduced moveable surface of the waters to unite with the cloud, would probably have raised up a column of salt water to meet it: and the appearances would then have made the phenomenon complete in all its parts.

The character of this period was certainly highly electrical: a display of excessive heat for ten days about the solstice, was introduced by SE winds, and ended, as usual in these cases, in a copious rain.

THUNDER AND HAILSTORMS.

The Papers make mention of violent thunder storms, attended with large hail, on the 9th of the Sixth month at Dunkeld (Scotland), and on the 10th, in the forenoon at Edinburgh and Dundee, and at midnight at Cupar in Fife. On the 24th there was a thunder storm at *Dublin*, which is a rare occurrence there.

The Bath Paper says—" The heat of the sun, during the last few days, has been more excessive than we have experienced for some years past. Friday (June 20th) Fahrenheit's thermometer stood at 82°; on Saturday, in the shade, it stood at 86° from three to five o'clock in the afternoon, being 10 degrees above summer heat, and, notwithstanding the cloudiness of the day, the thermometer was at 105 in a more exposed situation; and on Monday in the sun it rose as high as 113. At Weymouth on Saturday, the thermometer stood at noon in the shade at 86, and in the sun at 112: while at Gloucester, on the same day, it rose to 103 in the shade. This intense heat, as might be expected, has been productive of thunder-storms in many parts of the country. The vicinities of Gloucester and Tewkesbury experienced some of their effects on Saturday afternoon; and the inhabitants of the latter place have sustained considerable loss by the hail, which broke many windows.—At Lyneham, near Chippenham, on the same day, a water-spout inundated a considerable quantity of land, and occasioned a rapid rise of the Avon, which very sensibly affected the river at this distance.—Salisbury and its neighbourhood appears to have received the brunt of the storm. It commenced there about two o'clock in the afternoon, with almost an instantaneous darkness, and a violent rushing of wind from the north-east, accompanied by sheets of water and large pieces of ice. About three the wind from the north-east ceased, and suddenly commenced blowing from the south-west, with such torrents of rain for more than half an hour, that every street was flooded, and the water ran through many of the houses. The lightning was not very vivid, nor was the thunder extremely loud; but they continued during the whole of the storm, which lasted till six o'clock. Forty sheep, of a flock belonging to Mr. Swayne, of Langford, were struck down by the lightning, and six sheep and six lambs killed; several large trees were also blown down during the storm at Durnford and West Harnham. The storm also visited this city about two o'clock, and continued till five, but its effects were not marked by any extraordinary circumstance. But very considerable damage was sustained by the unexampled violence of a storm which occurred here on Monday afternoon (June 23d): the rain fell in such torrents that the common sewers were soon choaked, and the lower apartments of many houses were in consequence flooded; almost every hot and green-house, and sky-light, in the neighbourhood, suffered in its glass, more or less, from hailstones, many of which were two inches in circumference."—*Pub. Ledger*, *June* 27.

I had occasion from a curious accident to notice the weight of rain on the day of the last mentioned thunderstorm. Travelling with a relation, we had entered our inn at *Exeter* just as the storm began, it being evening, and taken possession of a parlour on the first floor; when in an instant a copious stream of sooty water flowing from the fireplace (the gutter having by some means found a discharge into the chimney) compelled us to summon the servants, and retreat hastily into another apartment.

The Dutch Papers contain various accounts of severe damage done by the storms of hail, accompanied with thunder and lightning, on the 25th, 26th & 27th of June.

Boitzenburg, *July* 2.—Yesterday we had a tempest with a terrible hailstorm, which has almost entirely laid waste the fields of Horst and Viechof, in Lauenburg; so many windows are broken, that there is not glass enough in town to repair them; the hail was jagged, and many pieces above one inch long.—*Pub. Ledger.*

From the Quebec Papers of the 10*th of July.*

FURTHER PARTICULARS OF THE EARTHQUAKE AT ST. JOHN'S, NEW BRUNSWICK.

The Earthquake was felt on the 22d ult. over all the island of Grand Manan, and has been thus described to us:—The reporter was awakened just after day-break by the shock of a loud sound, and a violent shaking of the house at the same instant. The shaking ceased very soon; but the sound, he thinks, continued from 30 to 45 seconds after he awoke, gradually lessening till it entirely died away. Some of the inhabitants say it was perceived much longer, but the best opinions were, that it lasted a full minute. All agree in describing the motion as most violent, and the sound to have been very loud; the weather at the moment was fine and serene, with a light breeze of wind from the northward: the previous day it had been uncommonly hot for the season. During the 22d, the weather continued fine and warm, the wind easterly, and light. This earthquake we already trace from Boston to Portland, St. Andrew's, and Frederickston, nearly 400 miles: and in another line, of a similar distance and parallel direction, taking the opposite side of the Bay of Fundy in its route, and going through Grand Passage, Digby, Annapolis, and Windsor, extending in each end of this line, from which we have yet no tidings.—*Pub. Ledger.*

	1817.		Wind.	Pressure.		Temp.		Hygr. at 9a.m.	Rain, &c.
				Max.	Min.	Max.	Min.		
7th Mo.	L. Q.	July 6	SW	29·68	29·59	70°	45°	48	—
		7	SW	29·73	29·67	71	46	45	
		8	SW	29·78	29·73				
		9	SW	29·78	29·73	75	47	44	
		10	S	29·68	29·66	76	48	46	—
		11	S	29·73	29·66	73	55	55	—
		12	NW	29·88	29·73	68	48	43	
		13	SW-	29·88	29·60	71	50	49	13
	N. M.	14	NW	29·60	29·14	70	52	65	72
		15	SW	29·54	29·06	70	49	46	18
		16	NW	29·77	29·54	69	49	46	
		17	NW	29·77	29·73	71	52	48	15
		18	NW	29·85	29·77	67	46	44	
		19	NW	29·90	29·85	69	42	41	
		20	S	29·90	29·81	72	54	61	3
	1st Q.	21	SW	29·85	29·70	73	56	63	4
		22	SW	29·85	29·75	70	52	40	
		23	SW	30·00	29·85	70	50	52	7
		24	SW	30·00	29·95	71	45	46	
		25	SE	29·95	29·80	72	50	40	
		26	S	29·80	29·60	66	47	50	20
		27	W	29·85	29·60	66	47	40	13
	Full M.	28	W	30·00	29·75	68	48	39	10
		29	W	29·75	29·69	70	50	45	14
		30	W	29·75	29·67	71	48	45	3
		31	SW	29·75	29·67	71	44	45	
8th Mo.		Aug. 1	SW	29·92	29·75	69	41	49	
		2	SW	29·92	29·65		54	50	
		3	W	29·75	29·65	68	46	54	
		4	SW	30·00	29·67	68	50	53	3
				30·00	29·06	76	41	48	1·95

Note,.—Seventh Mo. 6. Some rain, a. m.: windy: twilight orange coloured. 7. *Cumulostratus*: fair. 8, 9. Fair: cloudy: red sun-set. 10. Cloudy: calm: a light shower. 11. Cloudy: a light shower, a. m. 12. Cloudy: a light shower early: fair day. 13. Large *Cirri*: fine, a. m.: *Cirrocumulus*: *Cirrostratus*: windy: cloudy: shower, evening. 14. Cloudy morning, followed by several light showers. 15. Rain in the night, and a wet morning: much *Cirrostratus*, with a pretty calm air; afterwards the *Nimbus* prevailed, with sudden showers; and it was stormy at night. 16. Cloudy: calmer: fair. 17. Cloudy: *Cirro-*

cumulus: Cirrostratus: fair day: rain in the night after. 18, 19. Cloudy: windy: fair: a ruby-coloured twilight, the clouds rapidly dispersing at the time. 20. *Cirrostratus,* alternating with *Cirrocumulus:* then *Cumulostratus* and rain in the evening. 21. Cloudy, windy, a.m.: a fine display of *Cirrostratus* in elevated beds, passing to *Cirrocumulus.*

Eight Mo. 1. Chiefly showery for the last ten days, with thunder three times.

RESULTS.

The wind uniformly westerly, a single observation excepted, which was of short continuance.

Barometer:	Greatest height	30·00 in.
	Least	29·06 in.
	Mean of the period	29·743 in.
Thermometer:	Greatest height	76°
	Least	41°
	Mean of the period	59·32°
Mean of the hygrometer		48°
	Rain	1·95 in.

The period was throughout changeable, cloudy, and windy, the barometer fluctuating (save in one depression) between the limits of 29·5 and 30 inches. The rain fell chiefly in two distinct spaces of five days each, determined as it appears by the occurrence of New and Full Moon.

The following observation was communicated to me by my friend Thomas Forster, at Tunbridge Wells:

July 30, 1817.—11ʰ 30ᵐ, p. m. A fine coloured *paraselene,* about 23° ENE of the moon. It lasted about three minutes; and then there broke out from it a tapering or conical band in the direction *from* the moon, i. e. ENE; and in a minute more the whole disappeared. Features of *Cirrostratus* were discernible at the edge of the thin cloud in which it was seen.

About six o'clock last evening, the Metropolis was visited by a dreadful hail-storm from the westward, which must have damaged innumerable panes of glass in houses having a western aspect. The storm lasted about seven minutes, and most of the hailstones which fell were as large as hazel nuts.—*Pub. Ledger, July* 29.

TORNADOES.

Extract of a Letter from Derby.—"Friday afternoon (July 11), about two o'clock, this neighbourhood was visited by the awful, but happily very rare phænomenon of a tornado. It advanced from the south-west, and first came in contact with the earth near the Depot, about three quarters of a mile from Derby, where it was most violent. It there tore up a fine ash tree by the roots, several large branches of which were carried to a considerable distance; and in its progress it took up a quantity of new hay from the grounds of E. S. Sitwell, Esq. (not less than half a ton) which was carried to an immense height, dispersed to a wide extent, and carried along with the clouds.—The storm happily passed over without doing any injury to the town. It was accompanied by very heavy rain, which brought down portions of the hay, some of which was very closely matted together, but the greater part was borne along with the clouds till quite out of sight. The vanes of All Saint's Church were observed to turn round at intervals during the storm, and although the air must have been so greatly agitated in the upper regions, it was perfectly calm below. The storm took a northerly direction, and as soon as it had passed away the sky became clear, and the air remarkably hot; soon afterwards the clouds collected again with rain for the remainder of the day. The quantity collected in Mr. Swanwick's rain gauge was one inch and a half."—*Pub. Ledger, July* 21.

Altona, July 16.—On the 11th of this month 16 or 17 houses were entirely overturned, and several others considerably damaged by a water-spout (tornado) in the village of Wattenbeck, near New Munser.

Pforzheim, July 12.—Yesterday afternoon a dreadful hail-storm fell here, and also at Ispringen and Eukingen; the hail-stones were all triangular, and as large as pigeons' eggs. Many persons were severely wounded in the hands and head; a great many windows were broken, and what is more distressing, the fine corn-fields were almost entirely laid waste in a quarter of an hour.

INUNDATIONS ABROAD.

All the accounts from the Eastern part of Switzerland announce the terror and the damage caused by the late inundations.

The storms have carried desolation into the lower parts of the Canton of Glaris.

The Linth has broken its dikes in three places. The bridges of Glaris and Helstal have fallen down; that of Miolis threatens to go to ruin. Gessau, Rutti, Fleriscue, and Hagelschauer in Teggenburg, felt the whole violence of the storms of the 4th and 5th (July?). All the torrents have overflowed. The bridge of Aberglatt is in ruins.

At Basle the Rhine rose so much on the 6th, as to inundate the city as far as the fish markets; the citizens were forced to cross the streets in boats. The Rhine continually brought down with it trees, parts of buildings, and drowned animals, shewing by these numerous wrecks the ravages it has exercised elsewhere. At Constance the lake was much higher on the 6th than in 1666, and even some inches higher than in 1560.—In spite of unremitting exertions, the bridge of Lindau is carried away. On the banks of the lake many Communes are under water, and it is feared will continue so for a long time, the vents by which the waters must run off when the lake falls, being too small. In the Lower Rhinthal the surface of the waters which covers the fields and the roads, and upon which one may easily navigate between half ruined houses, was three leagues in circumference. At Horn, and all along the lake, a great many buildings are abandoned; the waters threaten the foundations of the most solid edifices. In the Oberland, many bridges have been carried away. The fields, the meadows, the plantations, were entirely submerged, and pieces of the soil were seen floating about, torn up by the fury of the waters, covered with potatoes, vegetables, and hay. On the 9th, during a violent tempest, the lightning struck the village of Deterswell, and burnt a house. Near Neutingen many cattle were killed by lightning. Other accounts, equally distressing, have been received from other quarters.—*Pub. Ledger*, *Aug.* 2.

WEATHER IN ICELAND.

Rikavick, *Aug.* 17, 1817.—Last winter was one of the severest we have had for a long while, in particular from the beginning of February to the end of March, with changeable winds and heavy snow. From the beginning of April until the 1st of May, we had often fine and mild weather with thaw; but on May 2, we had a storm from the north with much snow; and from that day until July 7 we had nothing but northerly winds with frost and cold weather. The Greenland drifting ice, which had left the northern land in the beginning of April, returned again in the first days of May, and surrounded the whole of the western, northern, and eastern land. From about July 7 the weather has been very dry and often pretty warm.—*Thomson's Annals of Philosophy*, vol. ii. p. 229; from the Danish Official Gazette, communicated by Sir Joseph Banks.

	1817.		Wind.	Pressure.		Temp.		Hygr.	Rain,
				Max.	Min.	Max.	Min.	at 9a.m.	&c.
8th Mo.	L. Q.	Aug. 5	NE	30·05	30·00	70	48	47	
		6	NE	30·00	29·85	74	40	44	
		7	NW	29·83	29·45	75	55	44	
		8	SW	29·58	29·45	67	48	55	
		9	W	29·72	29·59	71	45	44	
		10	SW	29·72	29·71	71	34	50	10
		11	SW	29·72	29·33	71	48	52	—
	New M.	12	SW	29·33	29·17	68	52	50	45
		13	SW	29·55	29·33	67	54	55	
		14	W	29·61	29·55	71	54	62	3
		15	W	29·78	29·55	68	46	48	4
		16	S	29·58	29·55	70	48	45	22
		17	W	29·87	29·59	66	45	50	6
		18	SW	29·64	29·59	66	54	49	28
	1st Qr.	19	SW	29·64	29·55	68	54	60	6
		20	W	29·64	29·55	69	50	50	—
		21	NW	30·02	29·64	59	42	64	12
		22	E	30·02	29·94	63	35	50	
		23	SE	29·94	29·68	67	48	58	
		24	S	29·68	29·20	65	50	45	—
		25	SW	29·20	29·00	62	48	63	29
	Full M.	26	S	29·08	28·90	64	44	55	15
		27	SW	29·55	29·08	68	51	48	3
		28	SW	29·64	29·54	68	51	50	12
		29	W	29·80	29·64	69	47	53	
		30	SW	29·80	29·75	71	54	53	18
		31	SW	29·95	29·75	67	41	53	
9th Mo.		Sept. 1	NE	29·98	29·95	69	37	64	
		2	E	29·98	29·83	69	48	58	
				30·05	28·90	75	34	52·3	2·13

NOTES.—Eighth Mo. 21. A wet morning: windy at N: p. m. cloudy, with wind about NNW: pretty calm at night. 22. Fair, with *Cirrostratus* beneath *Cirrus*: gold-coloured moon: calm at night. 23. Fine morning: there is said to have been hoar frost: a few *Cumuli* appeared, which soon became heavy *Cumulostratus:* and in the evening it was quite overcast, with a few drops of rain. 24. Fine, a. m.: the wind SE: a little rain, p. m.: during the day a singular anomalous veil of cloud overspread the sky, in which the *Cirrostratus* on the whole predominated: the lower surface of these clouds put on fine crimson and grey tints at sun-set, and the lights formed by the moon shining through them were peculiarly soft and pleasing. 25. Cloudy, a. m.: small rain: the wind gentle, veering to S: it rained much of the day at intervals: afterwards appeared groups consisting of *Cumulostratus* and *Cirrocumulus*, with *Nimbi*: hazy moonlight. 26. *Cirrostratus* in the morning: then *Nimbus*, and some rain: the wind gone back to SE, and moderate: many sudden showers of small amount from ill-defined clouds amidst haze: a bow soon after three, p. m.: windy night. 27. Fine morning: much dew: calm: *Cumulostratus* tending to *Cirrocumulus* above: some rain at mid-day. 28. Fine morning: *Cumulus* passed to *Cumulostratus*: a very few drops fell, p. m.: and there followed wind, succeeded by calm, with *Cirrostratus* and haze: rain in the night. 29. Fair: brisk wind, with various clouds. 30. A veil of *Cirrostratus* in flocks, a. m., with this, *Cumulus* rapidly inosculating formed *Cumulostratus*, which was heavy through the day: in the evening much *Cirrostratus*, succeeded by small rain: in the night a heavy shower. 31. Fine, with *Cumuli*, carried by a strong breeze.

Ninth Mo. 1. Misty morning, with *Cirrostratus* above, to which succeeded *Cumulostratus*. 2. Fine morning: wind NE, with *Cirrostratus*, which gave place to *Cumulus*: the evening was overcast, as for rain, but little or none fell, and in the night there was a most copious fall of dew.

RESULTS.

Winds Westerly, save twice about the last quarter of the moon, when they became Easterly.

Barometer:	Greatest height	30·05 in.
	Least	28·90 in.
	Mean of the period	29·63 in.
Thermometer:	Greatest height	75°
	Least	34°
	Mean of the period	57·65°
Mean of the hygrometer		52·3°
	Rain	2·13 in.

In the present, as in the last Lunar period, the reader will observe that the Last quarter, both in going off, and in approaching again, is dry; while the other three phases have the rain divided among them.

METEOR.

" *Tunbridge Wells, 6th August.*—Being out about midnight, and the sky being remarkably clear, wind SW, therm. 49°, I saw in the WSW a brilliant meteor, almost half the apparant bigness of the moon: it began at about 45° or 50° of altitude, and slowly descended, increasing in size: it might perhaps be near 10 seconds in falling: the colour of the flame was white till near its extinction, when it was bright blue, tinged with reddish at the top. The day previous had been fair, with regular Cumuli, evaporating in the evening, and scarcely any other modification discernible all day. The day following had Cirrus passing to Cirrocumulus all the morning, with a south wind. T. F."

ATMOSPHERIC ELECTRICITY.

On the 16th of the Eighth Month, being at Tunbridge Wells, I raised a pretty large kite, made of linen stretched upon two pieces of cane, and fitted with a separate conducting string, as described vol. 1. p. xxx.; which being kept up at different elevations, for several hours in the afternoon, the following phenomena were remarked.

About noon, with a moderate breeze at SW, while the sky was clear, or only covered by light Cirrus passing to Cirrocumulus and Cirrostratus, the apparatus gave only weak and moderate sparks, which were of positive electricity. But when, after this, some obscurity had began to appear in the sky to windward (the wind veering to S), and the rudiments of Cumuli, formed in a lower region, passed our zenith, the very first of these slight masses occasioned sparks attended with a sensation that reached to the elbows: a larger body of the same cloud soon after arriving, we received shocks extending quite to the feet, and too severe to be repeated often. At this time my son perceived a hissing noise, which seemed to attend the flying off of electricity from the reel: the sparks also became visible in full daylight, and a few drops of rain, from the skirt of a shower forming to windward, did not at all abate the charge. It was observed however by Dr. Forster, who was left with the appararus between two and three p. m. that a cold breeze, which preceded a cloud bringing a shower, entirely took off the charge for a time. At three p. m. the shower becoming too heavy to permit us to continue the experiment satisfactorily, the *bearing* string of the kite was lowered, until the *conducting* thread touched the ground, and in this situation of the two strings the kite was taken in without our sustaining the repeated shocks which would probably have been encountered in that operation in the common mode of raising it with a single string.

During the experiment the barometer was falling from about 29·40 to 29·30 in.: and the temperature at the close was 58°. The sky, after the shower, was obscured by a double veil of Cirrostratus, and there fell more rain about half-past five p. m. We observed no negative charge on this occasion.

It is remarkable that the *Leyden phial* cannot be charged, beyond a certain weak degree of intensity, at the string of a kite: the charge is acquired by a single spark, and the person holding the phial is shocked by that and by each succeeding contact. It seems that the electric fluid passes (if I may be allowed the expression) with a *greater momentum*, when it has to glide down from a long elevated conductor, than when it is received by approach to a body insulated near the surface of the earth. I am aware, however, that the principles of electricity may supply a different explanation of this singular fact.

TABLE CXXXV.

	1817.		Wind.	Pressure.		Temp.		Hygr.	Rain, &c.
				Max.	Min.	Max.	Min.	at 9 a.m.	
9th Mo.	L. Q.	Sept. 3	SE	29·96	29·79	75°	53	65	
		4	Var.	30·10	29·96	69	43	63	
		5	Var.	30·10	30·03	73	46	60	
		6	Var.	30·03	30·00	63	47	59	
		7	SE	30·03	29·91	71	44	60	
		8	E	30·07	29·94	76	47	58	
		9	NE	29·96	29·94	66	54	63	
		10	N	29·97	29·92	65	50	59	
	New M.	11	NE	29·92	29·87	68	49	65	
		12	Var.	29·93	29·80	68	49	62	—
		13	SE	29·93	29·85	66	53	56	—
		14	NE	29·93	29·83	63	56	63	0·17
		15	NE	29·98	29·93	66	60	64	
		16	SE	29·98	29·94	72	51	63	
	1st Q.	17	NE	29·94	29·61	70	54	60	
		18	N	29·76	29·56	62	55	62	4
		19	W	29·95	29·76	67	47	57	
		20	NW	29·95	29·91	64	55	53	
		21	NE	29·91	29·83	63	42	61	
		22	NE	29·83	29·80	59	47	53	
		23	NE	29·90	29·80	64	47	52	
		24	SE	29·90	29·52	66	47	51	
	Full M.	25	SW	29·52	29·16	64	55	65	—
		26	SW	29·31	29·16	60	47	58	0·20
		27	SW	29·65	29·31	58	44	48	7
		28	W	29·95	29·65	59	33	55	
		29	NW	29·95	29·89	58	43	54	
		30	NE	29·89	29·75	55	42	53	
10th Mo.		Oct. 1	NW	30·02	29·75	56	30	57	
		2	W	30·05	30·02	46	24	48	
				30·10	29·16	76	24	58	0.48

Notes.—Ninth Mo. 3. Much dew: very fine day, with *Cirrus* only, in horizontal striæ: temp. 72° after sun-set. 4. Dew: fine morning: *Cirrocumulus*, followed by cloudiness from S, about nine: clear afterwards, save a line of low thunder clouds in the NE. 5. Fine, after misty morning: large *Cumuli*: at night the floating dust and smoke assumed the horizontal arrangement usual before the *Stratus*. 6. Misty morning: afterwards large plumose *Cirri*, passing to *Cirrocumulus*: p.m. some delicate streaks of *Cirrostratus*, with two currents near the earth at sun-set, SW above E. 7. Serene day, after misty morning: a very luminous, yellowish, evening twilight, with crimson streaks of *Cirrocumulus*, and a dewy haze round the horizon. 8. As yesterday, with *Cirri*, finely tinted in orange at sun-set. 9. Overcast, a. m.: at sun-set, *Cirrostrati* from SE. 10. Overcast morning: then *Cumuli*, with an electrical character: a fine breeze these three days. 11. Calm misty morning: then lightly clouded till evening. 12. Misty morning: after a little rain, the sky exhibited a veil of clouds moving from the SW. 13. *Cumulostratus* through the day. 14. Rain very early: temp. 63° at nine, a. m.: mild and damp air. 15. Cloudy, close, damp, day and night. 16. Overcast, with a breeze. 17. Misty morning: then sunshine and flying clouds. 18. Slight showers, with wind. 19. Cloudy morning: luminous evening twilight, orange, with rose colour above. 20. Clear dewy morning: the temp. scarcely varied from 55° through the night: *Cumulus*. 21—23. Fine, with breeze pretty strong, and various clouds. 24. The lateral approach from the southward of the westerly current was indicated to-day by the southing of the wind, by heavy *Cumuli* and *Cumulostrati* in the SE, and by a lurid haze, with greenish streaks of *Cirrostratus*, before the moon. 25. A gale from SW, with light rain: in the evening a lunar corona with *Nimbus*: heavier showers in the night. 26. Showery morning: then *Cumuli*, carried in a fine blue sky: evening showery: night windy. 27. Wind and showers. 28. The morning gradually cleared up, with *Cirrostratus* passing to *Cirrocumulus*, and some very elevated *Cirri*: at sun-set these showed red, stretching SW and NE. 29, 30. The wind, after going to SW for a short time, came round by N to NE, with fine weather.

Tenth Mo. 1 Fine: very red *Cirri* at sun-set. 2. Hoar frost, with ice.

RESULTS.

Winds Easterly, interrupted after the full moon by a gale from the westward.

Barometer:	Greatest height	30·10 in.
	Least	29·16 in.
	Mean of the period	29·842 in.
Thermometer:	Greatest height	76°
	Least	24°
	Mean of the period	55·76°
Mean of the hygrometer		58°
	Rain	0·48 in.

We have here, for the third time in the space of three months, a striking relation between the occurrence of rain, and the times of the Moon's being in opposition and conjunction: but in the present case the rain followed instead of preceding or accompanying those phases. The Last quarter is dry, as in the two periods before, and the First nearly so.

TABLE CXXXVI.

	1817.		Wind.	Pressure.		Temp.		Hygr.	Rain,
				Max.	Min.	Max.	Min.	at 9a.m.	&c.
10th Mo.	L. Q.	Oct. 3	NE	30·14	30·05	50	32	65	
		4	NE	30·22	30·14	57	32	55	
		5	NE	30·25	30·22	56	33	56	
		6	NE	30·25	30·10	54	39	55	
		7	E	30·10	30·06	54	43	51	
		8	NE	30·06	29·95	54	35	46	
		9	NE	29·95	29·87	53	39	59	
	New M.	10	N	29·92	29·86	56	41	56	
		11	NE	29·99	29·92	50	36	54	—
		12	N	30·15	29·99	52	35	55	5
		13	NE	30·22	30·17	52	32	59	—
		14	N	30·22	30·02	50	42	64	—
		15	NW	30·02	29·80	48	37	64	6
		16	NE	30·05	29·80	48	36	60	30
	1st Q.	17	NE	30·05	29·86	48	37	59	5
		18	E	29·87	29·77	45	37	54	17
		19	N	29·91	29·87	45	42	62	
		20	N	29·89	29·85	48	40	64	3
		21	E	29·79	29·77	52	39	65	
		22	N	29·90	29·79	48	36	65	
		23	NE	29·90	29·88	50	40	63	—
		24	NE	29·88	29·81	46	38	65	4
	Full M.	25	SE	29·81	29·71	50	37	65	
		26	S	29·69	29·65	52	28		
		27	SW	29·43	29·32	49	32		12
		28	SW	29·41	29·39	48	32		16
		29	SW	29·55	29·21	49	27		8
		30	S	29·49	29·14	57	42		21
		31	S	30·25	29·46	52	28		7
11th Mo.		Nov. 1	Var.	30·34	30·16	49	27		
				30·34	29·14	57	27		1·34

Tenth Mo. 3. Hoar frost, with ice. 4. A strong breeze: clear morning: the wind, p. m. tending to SE, with *Cumuli*. 5. The same breeze still: *Cumulus*, succeeded by *Cumulostratus*, which became heavy by noon; when the smoke of the city, being drawn up in a column in the SW, mingled with the clouds, and gave occasion (as it appeared) to a local shower: it drizzled a little with us, and there was a bank of clouds beneath dewy haze in the NE at sun-set. 6, 7. Some wind, especially by night: *Cumulostratus*. 8. *Cumulus*, &c.: windy. 9. *Cumulostratus:* windy: SE, p. m. 10. *Cumulostratus*, somewhat heavy, with an excessive rising of the dust in the evening. 11. A fresh breeze again, with fleecy *Cumulus* and *Cirrostratus:* a little rain, mid-day: very fine orange twilight. 12. As yesterday: slight showers by inosculation of different clouds: the product of the rain-guage includes much dew. 13. A strong breeze, NNE, a. m.: some drizzling rain: twilight fainter orange. 14. Misty morning: a little drizzling, p. m. 15. Some rain, mid-day and evening. 16. Wind got back to NE, and fresh, a. m.: rainbow at eleven: wet, mid-day: then cloudy. 17. Showers, with hail, about noon. 18. Cloudy: wind fresh, going first to NW, then back to E: showers. 19. Temp. 45° at nine, a. m.: dark and cloudy through the day. 20. Gloomy: misty: but little wind. 21. The same. 22. Lighter sky: wind to SE, and at night back to N. 23. Wind brisk at NNE, with a lofty sky: a shower, p. m. 24. Drizzling: dark, a. m. 26. Fair: *Cumulus*, with *Cirrocumulus* and *Cirrostratus*: the moon rose gold-coloured: a clear night ensued. 27. Misty morning: rain, with wind, at night. 28. Misty: the trees dripping: the wind to S, then back to SW, with pretty heavy rain. 29, 31. After a moderate gale from the southward, the barometer rose rapidly, with squalls of wind, showers, and hoar frost.

Eleventh Mo. 1. Very fine day: misty at night, probably from a *Stratus*.

RESULTS.

The wind, which was chiefly from the NE to the time of the Full moon, came round afterwards (as in the last period) to the SW for a few days only.

Barometer:	Greatest height	30·34 in.
	Least	29·14 in.
	Mean of the period	29·881 in.
Thermometer:	Greatest height	57°
	Least	27°
	Mean of the period	43·27°
	Rain	1·34 in.

The hygrometer having been out of order, the latter week's observations on it are uncertain. I found the *evaporation* to proceed of late in the following ratio, viz.:—

In eight days preceding the 3d of 10th month	0·42 in.
In seven days preceding the 10th	0·37
In seven days preceding the 17th	0·22
In eight days preceding the 25th	0·10
In eight days to the close of the period (with considerably more wind stirring)	0·12

The capacity of the air for water has, therefore, decreased more rapidly than the daily mean temperature, the approaching change of the atmospheric current being the probable cause.

Hurricane in the West Indies.

A Hurricane raged in the West India islands on the 21st of the Tenth month, which is thought to have been more destructive than any since the year 1780. Its ravages appear to have extended in breadth at least from the 12th to the 18th degree of north latitude, but to have affected principally the islands of Dominica, Martinique, St. Lucia, and St. Vincent; and, in a less degree, Barbadoes, which lay to leeward with regard to the storm. The wind is stated to have set in at day-break from the NW and to have raged with tremendous violence, with occasional falls of rain, until three in the afternoon, when becoming southerly it abated, but did not immediately cease.

At St. Lucia, the government house and barracks were blown down and their inmates buried in the ruins; the crops and forests, in short the whole face of the island, desolated, and every vessel in the port lost. Some of the numerous documents inserted in the papers relative to this disaster may be suitably presented to the reader as descriptive of these tremendous visitations.

OFFICIAL.

The following Letter on this lamentable occasion was addressed by the Colonial Secretary of St. Lucia to the Governor of Barbadoes:—

"*St. Lucia, Oct.* 23, 1817.

"My Lord,—His Excellency Major General Seymour being unable to address your Lordship, in consequence of the very serious injury he received during the hurricane of the 21st instant, (and, I am sorry to add, very little hopes are entertained of his recovery), his Excellency has directed me to give your Lordship the particulars, and earnestly to entreat your Lordship's assistance and support towards ameliorating the situation of the unfortunate inhabitants of this island, not one of whom but has suffered severely thereby.

"Scarcely a dwelling or a negro house is left standing: the mills and outbuildings either unroofed or razed to the ground; nearly the whole crop of canes torn up by the roots, and the face of the island, which was luxuriant on the 20th, now bears the appearance of an European winter.

"The town of Castrees is nearly in ruins, and the vessels, about 12 sail, are on shore, not one of which is expected to be saved. The whole of the buildings of Morne Fortunée and Pigeon Island were blown down, with the exception of the magazine and tanks.

"His Excellency and family were taken from under the ruins of his residence (the Commandant's quarters), where he remained in the hope that it would have resisted the gale; but he has, unfortunately, suffered for his imprudence.

"I have the honour to be, my Lord, your Lordship's most obedient Servant,

"L. R. Baines, Colonial Secretary."

"P.S. Since writing the above I am sorry to acquaint your Lordship, that great fears are entertained that General Seymour cannot pass 48 hours."

Extract of a Letter from St. Pierre, Martinique, dated November 10, 1817.—"On the 21st of October, this Colony was visited by the most furious hurricane ever witnessed here; the details of this sad disaster would be equally long, as painful. The loss of nearly 1800 lives, 25,000 hhds. of sugar of the present and next crop, incalculable losses in buildings, animals, and the necessaries of life, have occasioned a general desolation, independently of the great anxiety caused by nine-tenths of the shipping, which were in different ports of this island, being either wrecked, damaged, or missing. St. Lucia and Dominica have equally suffered; the tempest reached also St. Vincent's and Grenada. Its ravages also extended to Guadaloupe, as well as Porto Rico and its neighbourhood, though in a less degree. The loss experienced by Martinique alone, may be very moderately calculated at 25,000,000 of francs, exclusive of the shipping. The works and buildings of entire parishes were razed to the ground; it lasted 26 hours, 12 of which with such inconceivable fury as to produce all these disasters, and to destroy buildings which had withstood all former hurricanes. — It will require many years before the colony can recover itself from this heavy calamity."

A Letter from an Officer on board His Majesty's ship Antelope, at St. Kitt's, dated Nov. 12, *says:*—"We were lying at St. Lucie quietly at anchor, only the day before the hurricane came on, and got under sail for Barbadoes (as was our intention) about seven in the morning of the 20th, it being fine weather. At twelve o'clock the night following the officer of the watch hailed the master, and said the wind had come round to the north-west, which was very unusual in this country, where easterly winds prevail all the year through, and that the weather appeared to be coming on bad; the Admiral and Captain were immediately upon deck; we took in all our sails except the fore sail, which was reefed; got the top-gallant-masts upon deck, and prepared for the worst. At three in the morning of the 21st instant, it blew very hard at west, with tremendous heavy rain; at four still harder: took in our fore-sail, and brought her to under a try-sail double-reefed; at seven yet harder, when a sea came and washed away one of our boats from the stern. When ten o'clock came it blew a perfect hurricane beyond what any of us had ever witnessed; however, the ship lay very quiet and behaved very well, but from the heaviness and quantity of rain, with the immense force of wind, all our cabins were full of water. At noon the weather abated, and at three in the afternoon it became quite moderate, when we set our sails again.—We visited St. Lucie sixteen days afterwards, and the scene was such as my pen cannot describe: many of the inhabitants lost their clothes, and those who are sick, are lying on the ground with no other covering than the sky, exposed to sun and rain.

Extract of a Letter from an Officer on board one of His Majesty's ships, dated *Barbadoes, November* 30, 1817:—

"On our first making the Island (St. Lucie) we were struck with astonishment at the total change in the whole face of the country. We left it the day before the hurricane a beautiful rich green, and every thing in a most flourishing state. It has now the appearance of a severe European winter. We went on shore on the 7th of November; the scene of destruction which then presented itself is far beyond my power of description. On Pigeon Island, three houses only are left standing out of nearly 250, the rest, with the church, are almost totally demolished; one of the three is shifted 15 feet off its foundation, without going to pieces. The two large tamarind trees, under which the Negroes always met to dance on Saturday and Sunday evenings, were torn up by the roots, which by their spread in this rather sandy soil, nearly equal the branches in circumference. The woods with which this island particularly abounds are more or less scattered, according to their exposure to the gale; many of the trees which are left standing, have only a few of the ragged stout branches remaining. In the deep ravines the wind appears to have acted in a whirl; for immense trees are completely thrown down and twisted up in heaps in a most astonishing manner. The inhabitants tell us the great hurricane in 1780 was not equal to this."—*Pub. Ledger.*

From the India Gazette.

BOMBAY, *October* 20, 1817.—Until yesterday the rain has continued, during the last week, to come down almost without intermission: the quantity which has fallen in this monsoon is uncommonly great, the accounts taken by different rain guages give upwards of 95 inches since the 2d June, being above a fourth more than the average fall of former years. The weather has now cleared up, with every appearance of continuing fair and hot."

The following is an Extract of a Letter from ST. PETERSBURGH.

"Advices from Georgia of the 13th ult. state, that on the 21st of October, an immense avalanche fell from the mountain of Kasbeck, and covered an extent of three wersts in length, to the height of 50 fathoms. It completely dammed up the rapid river of Tereck; which, however, on the third day, worked a passage for itself underneath the mass of snow. This accident for some time interrupted the communication with Georgia. Fortunately, there were no travellers passing when it happened. Nine years have elapsed since the last avalanche occurred: though, according to the reports of the inhabitants, they generally take place once in seven years, and in the summer."—*Pub. Ledger, Jan.* 14.

TABLE CXXXVII.

	1817.		Wind.	Pressure.		Temp.		Hygr. at9a.m.	Rain, &c.
				Max.	Min.	Max.	Min.		
11th Mo.	L. Q.	Nov. 2	S	30·19	30·11	57°	41°		
		3	SE	30·10	30·06	54	49		
		4	SE	30·06	29·91	55	45		
		5	SE	29·88	29·85	54	44		
		6	S	29·85	29·69	55	49		6
		7	SW	29·69	29·43	58	50		13
	New M.	8	SW	29·61	29·35	55	44		5
		9	W	29·90	29·61	51	40	63	
		10	SW	29·89	29·66	55	44	95	
		11	SE	29·70	29·68	52	38	62	14
		12	SW	29·73	29·49	55	38	100	2
		13	SE	28·73	29·48	52	38	70	—
		14	SE	29·48	29·26	54	49	86	76
	1st Q.	15	W	29·79	29·26	55	40	80	10
		16	SW	30·15	29·79	54	39		
		17	SW	30·17	30·16	59	50	83	
		18	W	30·38	30·16	57	35	67	
		19	NW	30·45	30·43	49	30	85	
		20	SW	30·43	29·87	46	38	96	
		21	N	30·12	29·87	52	37	72	
		22	NW	30·12	30·05	47	37	73	
	Full M.	23	W	30·05	29·82	46	41	65	
		24	W	29·78	29·70	49	32	71	—
		25	W	30·00	29·78	44	34	64	15
		26	NW	30·07	30·00	52	40	78	
		27	SW	30·08	30·06	51	37	65	
		28	SW	30·06	29·92	49	40	67	
		29	SW	29·93	29·87	54	49	78	3
		30	SW	29·87	29·79	54	52	79	5
12th Mo.	L. Q.	Dec. 1	SW	29·79	29·54	54	46	80	51
				30.45	29·26	59	30	76	2·00

Notes.—Eleventh Mo. 2 to 4. Nearly calm: dripping mists, with alternate obscurity by *Cirrostratus*, and sunshine. 5. A slight shower at night. 7. A gale at SW: showers by night. 8. Squally: several showers in the day. 9. Windy, fine, with *Cumulus*, *Cirrus*, and *Cirrostratus*. 10. Misty morning: *Cirrus*, *Cirrostratus*: fair day: windy at night. 11. Fine morning: then quickly overcast and wet, a. m.. 12. Red sun-rise: then *Cirrostratus*, speedily general: cloudy till evening: windy at night. 13. Fine morning, with *Cirrostratus*: fair day: rather windy night. 14. Much *Cirrostratus* in the morning:

rain by half past nine: fair evening. 15. Wet, gloomy morning: calm and lighter, mid-day: p.m. the wind went to W, and blew strong: clear night. 16. Coloured *Cirri* with *Cirrostratus* at sun-rise: misty: steady breeze, with some appearance of distant rain: cloudy evening. 17. Fair: somewhat windy night. 18. Fair: *snow* fell within a few miles of us: evening twilight luminous and orange-coloured. 19. *Cirrocumulus*, *Cirrus* and *Cirrostratus*: abundant dew on the grass all day: very fine sky. 20. Very misty, a.m.: the trees drip much: fine, p.m. with dew and large *Cirri.* 21. Cloudy: rather windy: little or no dew this morning: *Cirrostratus*, *Cumulus:* the wind got to N at night. 22. Fair: *Cirri* in lofty bars, stretching N and S, followed by *Cirrocumulus*, and a group of clouds among the smoke of the city. 23. Fine, clear morning: grey sky after. 24. *Cirrostratus* with *Cirrus*, at sun-rise: a little light rain, p.m.: lunar corona, followed by a large faint halo. 25. Hoar frost: a steady gale through the day, with an appearance of *Nimbi* in the NW: rain after sun-set. 26—28. Fair: somewhat windy, with *Cirrostratus*, &c. 29. The hygrometer stood at 78° till noon: a little rain fell, a.m. and at night: the bees came out in considerable numbers, continuing however about the hive. 30. Overcast, windy: the maximum temp. at nine, a.m. or rather, the whole 24 hours warm alike.

Twelfth Mo. 1. A wet day.

RESULTS.

Winds Southerly and Westerly.

Barometer:	Greatest height	30·45 in.
	Least	29·26 in.
	Mean of the period	29·878 in.
Thermometer:	Greatest height	59°
	Least	30°
	Mean of the period	47·11°
Mean of the Hygrometer		76°
	Rain	2 in.

Evaporation, 1·02 inch, divided as follows: to the 9th, 0·27; to the 15th, 0·40; to the 23d, 0·23; to the end, 0·12.

The *mean temperature* of this period instead of falling some degrees (as might have been expected from the season) is near 4° higher than that of the last. But in the Tenth month it had undergone a disproportionate depression of 12½ degrees, (as will appear on comparing together the results of Tab. 135 and 136) for which the present warmth may be considered as a compensation.

The Rain appears now to be quitting the vicinity of the times of New and Full Moon, and attaching itself to the quarters. Yet the space of three or four days following the Last Quarter is dry, as it has been in four successive periods since the Summer solstice. It will be found however, on examining the Tables, both forward and backward, that this portion of the Lunar period is subject at times to heavy rain.

TABLE CXXXVIII.

	1817.		Wind.	Pressure.		Temp.		Hygr. at 9a.m.	Rain, &c.
				Max.	Min.	Max.	Min.		
12th Mo.	L. Q.	Dec. 2	NW	29·45	29·43	47	29	71	2
		3	NE	29·86	29·40	41	28	78	5
		4	E	29·87	29·71	42	29	83	
		5	S	29·87	29·37	47	38	69	27
		6	NW	29·38	29·37	41	28	83	
		7	SW	29·37	28·61	42	32	92	13
	New M.	8	Var.	29·07	28·54	45	36	85	48
		9	NW	29·22	29·07	43	28	69	
		10	NE	29·51	29·22	35	21	73	—
		11	Var.	29·67	29·51	32	18	80	
		12	SE	29·67	29·61	37	23	83	—
		13	SE	29·61	29·48	40	35	85	40
		14	SE	29·57	29·34	48	32	98	24
	1st Q.	15	SW	29·80	29·57	43	34	97	72
		16	SW	29·53	29·30	50	35	96	32
		17	SW	29·53	28·88	48	35	74	67
		18	SW	28·88	28·74		34	65	2
		19	Var.	29·30	28·88	46	39	76	15
		20	NE	29·56	29·50	40	27		
		21	NE	29·50	29·44	33	28		
		22	N	29·53	29·46	33	29	74	
	Full M.	23	SE	29·65	29·48	32	20	65	
		24	NE	29·90	29·65	32	24	80	
		25	NE	30·06	29·90	33	22	78	
		26	Var.	30·08	29·80	36	22	77	10
		27	SW	29·62	29·45	37	32	92	5
		28	NW	30·10	29·62	38	21	72	
		29	SW	30·10	29·97	33	23	65	
		30	Var.	30·00	29·93	40	22		6
	L. Q.	31	NE	30·01	30·00	35	21	93	
				30·10	28.54	48	18	78	3·68

NOTES.—Twelfth Month. 2. Some rain, a. m. 3. Hoar frost; *Cirrostratus*; the sky quickly overcast: some sudden showers followed: in the evening *Nimbi*, the wind going to NE with force. 4. Hoar-frost: fine, with *Cirrostratus*: misty p. m.: windy night. 5. Very cloudy, a. m.: a gale in the night, followed by rain. 6. Overcast, a. m.: fine and calm mid-day: *Cirrocumulus*. 7. Hoar frost: *Cirrostratus*, with a stormy appearance, a. m.: fine, p. m.: rain, with a gale of wind, in the night. 8. *Cirrostratus* at sun-rise, the wind gone down: wet at intervals: *Nimbi*: much wind again at night. 9. Cloudy, a. m.: about noon *Cirrostratus*, and after it *Cirri* in elevated bars stretching N and S, coloured red at sun-set: starlight, with small meteors. 10. Snowing by nine, a. m.: at eleven the ground was white, when it ceased: clear night. 11. The sun emerged from *Cirrostrati:* rather misty air: the wind gentle at SW, a. m.: but easterly in the night. 12, a. m. Vane at SW: calm: much rime, with a misty air till evening: a thaw in the night. 13. Obscure by *Cirrostratus*, a. m.: the hygrometer proceeding towards moisture: rain, gentle in the day, heavier, with wind, in the night. 14. *Cirrostratus* prevailed in a uniform close canopy about the height of the neighbouring hills, on which I found it misty in consequence, while small rain fell below: early in the night came on wind, with showers. A perfect, but colourless *lunar bow*, was observed about ten, p. m. and reported to me by a gentleman whom I met at Stamford Hill in the morning. 15. Hoar frost: the sun emerged from a low *Cirrostratus:* very wet, p. m. and night. 16. Wet, a. m.: in the night a heavy gale, ceasing about three. 17. Fair, a. m.: obscure afterwards by *Cirrostratus:* in the night a most violent westerly gale, increasing and decreasing in force by slow intervals, with much rain. 18. Windy: bright moonlight. 19. Wet, p. m. 20. The wind got to NE, a fresh breeze, but at night the clouds came from NW. There was a manifest attraction between the low clouds and the smoke of London. 21. Fair: the clouds tending to *Cumulostratus*. 22. A very slight sprinkling of snow, crystallized in stars. 25. The same, in grains as fine as basket salt. 26. Orange-coloured sun-rise, with red *Cirri*: hoar frost: a lunar corona last night, surrounded by a coloured halo. 27, After fine dry frost for some days, a thaw early this morning, with rain: in the night a gale, with showers, after which a ground frost. 28. A little snow at mid-day: the temp. 19° on the ground at night. 30. Wet, p. m. 31. A frozen mist came on at eight, a. m. from the southward; and after a clearer interval there was again a very thick fog in the evening.

RESULTS.

Winds variable.

Barometer:	Greatest height	30·10 in.
	Least	28·54 in.
	Mean of the period	29·508 in.
Thermometer:	Greatest height	48°
	Least	18°
	Mean of the period	32·66
Mean of the hygrometer		78°
	Rain	3·68 in.
	Evaporation	0·38 in.

LARGE METEOR.

"On the morning of the 8th inst." (Dec.) says the observer, who dates from Ipswich, "I was looking at Mars, whose position is near to the star in the bull's northern horn. About midway between the horns I suddenly perceived a fiery body resembling a red-hot ball of iron, four or five inches in diameter, which having passed three or four degrees in a direction between the principal stars of Capella and Canis minor, burst into a spherical body of white light nearly as large as the full moon, of so great lustre as scarcely to be borne by the eyes, throwing out a tail about three degrees in length of a beautiful rose colour tinged round the edges with blue. It thus proceeded in its course without apparent diminution towards the principal star in the head of Hydra, (very near to the ecliptic,) a little beyond which it suddenly disappeared (I believe) with an explosion; as I distinctly heard a rumbling noise like that of cannon discharged at a distance, about ten or twelve seconds afterwards. Its duration as nearly as I can estimate was about five seconds, during which it traversed a space of nearly sixty degrees. It is scarcely possible to give an adequate description of the vivid splendour which characterized this extraordinary phænomenon. It cast a light around equal to the noon day's sun: I could compare it to nothing so well as the beautiful dazzling light exhibited by the combustion of phosphorus in oxygen gas; its effect upon the organs of light being analogous. The barometer was falling at the time, and in the course of the night fell altogether an inch and one tenth; the thermometer at 42°. Within a quarter of an hour afterwards the atmosphere became entirely obscured by clouds; violent tempests of wind and rain succeeding, although the stars were previously visible and the zenith free from vapours." J. A.—*Philo. Magazine.*

The most remarkable circumstance in this account is, that the eye of the spectator having been favourably directed at the moment, he had an opportunity of seeing (what I believe is very seldom witnessed) the *beginning incandescence* of one of these bodies, and of tracing its motion before it had become completely ignited. Leaving for a future occasion any general reasoning which might be founded on this, I may observe that as these meteors are not *necessarily* very elevated or very distant, the appearance of the present one *may* have had some connection with the low Barometer, the supervening cold current, and the copious precipitation of water, which we find registered upon and subsequently to the day of its appearance. It may be remarked also that *small meteors* were sufficiently frequent on the following evening, to induce me to note their occurrence.

GALES OF WIND AND THUNDER STORMS.

The storm which raged in the night between the 7th and 8th of December, destroyed in the Channel 20 vessels from the coast of Brest to St. Maloes.

Falmouth, Dec. 8.—It has blown all day a hurricane, from W to NW, and still continues with unabated violence. The gale commenced about 12 o'clock last night, but up to this time (9 a.m.) the East and West Indiamen ride it out, and no damage of any kind has yet happened.

A dreadful storm was felt in the Bay of Biscay on the 9th, 10th, and 11th December; a vessel was wrecked on the bar of Bayonne; and the plains of the Adour and the Nive were inundated. At St. Jean de Luz, the dyke which defended the town from the ocean was much damaged, and the inhabitants seriously alarmed.

We fear we shall receive more distressing accounts of the damage done on our coasts by the severe gales which have blown since the beginning of the present month. Last Sunday night, and on Monday (Dec. 14—15), there was another storm; and the agent to Lloyd's, at *Poole*, represents it as most tremendous. It was accompanied with the most awful thunder and lightning.—*Pub. Ledger.*

A *Whitehaven* paper says — The weather in the course of the last week, has proved the most tempestuous that has been experienced in this part of the country for a long time past.—On the night of Monday, the 15th Dec. we had one of the most tremendous thunder storms perhaps ever known in this part of the kingdom. Its greatest violence was between the hours of nine and ten. The peals were awfully loud, and the lightning astonishingly vivid and frequent.

The *Hull Advertiser* of the 20th Dec, says — On the nights of the 16th and 17th, this town and neighbourhood were visited by a most violent gale of wind attended with heavy rain, of the effects of which in some parts of the country the accounts are very distressing.

Jersey, Dec. 19. — For some days past, perpetual storms, attended with heavy rain, mixed with hail, have prevailed here, wind varying from N to NW W and SW.

CITY FOGS.

The fog of Wednesday (Dec. 31,) seems to have been confined to the Metropolis and the immediate vicinity. No further to the Northward than the back of Euston-square, the weather was clear and even bright. A gentleman, who came to town from Enfield, saw no fog till he approached London. Southward of London, it extended as far as Clapham, and it was rather thicker in some of the environs, than in the Metropolis itself. Upon an average, ten feet was the distance, at which objects became invisible, out of doors. Within doors it was impossible to read without a candle.

The following paragraph from *The Freeman's Journal* of January 1, shows, that the fog on Wednesday last was as thick in Dublin as in London:—The oldest person living has no recollection of a fog so thick as the one which enveloped this city last evening, between the hours of six and nine. It was more dense in some streets than in others, and where this was the case it was impossible to pass with convenience without the aid of opened lanterns.—*Pub. Ledger.*

TABLE CXXXIX.

	1818.		Wind.	Pressure.		Temp.		Hygr. at 9 a.m.	Rain, &c.
				Max.	Min.	Max.	Min.		
1st Mo.		Jan. 1		30·01	29·96	33°	21°	90	
		2	SE	29·96	29·58	33	31	80	
		3	SE	29·58	29·43	40	32	75	13
		4	S	29·64	29·48	44	32	100	—
		5	Var.	29·90	29·48	42	28	80	51
	New M.	6	SW	30·15	30·10	41	29	85	
		7	SW	30 03	29·82	47	36		17
		8	NW	30·18	30 05	41	29	58	
		9	SW	29 85	29·76	48	39	83	11
		10	SW	29·75	29·72	52	47	93	3
		11	NW	29 76	29·50	49	36	80	9
		12	SW.	29·92	29·78	47	37	60	3
		13	SW	29·85	29·79	50	40	77	—
	1st Q.	14	SW	29·83	29·60	50	39	95	24
		15	W	29 80	29·56	53	45	70	—
		16	W	29·76	29 46	50	35	58	16
		17	W	29·88	29·85	40	32	60	
		18	Var.	30·40	29 85	42	28	65	—
		19	SW	30·43	30·30	38	27	70	
		20	Var.	30·30	29 85	40	28	95	
		21	Var.	30·12	29·92	45	26	89	
	Full M.	22	SW	29·65	29·40	45	31	90	12
		23	Var.	29·60	29·42	41	28	72	18
		24	NW	29·93	29·39	43	29	93	9
		25	W	28 87	29·79	47	34	72	1
		26	SW	29 88	29·60	52	32	76	1
		27	SW	29·88	29·50	46	35	72	17
		28	NW	29.65	29·50	43	28	85	—
	L. Q.	29	SW	29·65	28·98	43	32	77	27
				30·43	28·98	53	21	78·5	2·32

Notes.—First Mo. 1. Fine. 2. Much wind in the night: snow by morning. 3. After some snow, a thaw, p. m. 4. Small rain, a. m.: fair, p. m.: starlight. 5. Wet stormy day: clear night. 6. Hoar frost: fair. 7. Fair, a. m.: cloudy, p. m.: a gale, with rain, during the night. 9. Wet mid-day: the *Cirrocumulus* has appeared two or three times within a week past. 10. *Cirrus* and *Cirrostratus* at sunset, rose-coloured, followed by a gale with rain. 11. Gloomy, a. m. with small rain, p. m. and night as yesterday. 12. Fine day: a gale again in the night. 13. The gale continued, with cloudy weather:

the night, after a calm evening, was stormy. 14. Wet stormy day: in the evening, *Cumulus*, with *Cirrostratus* and *Cirrus:* the air clearing: much wind in the night. 15. Much cloud and wind, a.m.: small rain, p.m. night stormy. 16. Fair, with a gloomy sky, a.m.: some rain, p.m.: a heavy gale in the night. 17. The wind is now more moderate, with a tendency to NW: a very fine day and night. 18. Fair, with a breeze: a squall, with a little rain, p.m.: bright moonlight. 19. Fine. 20. Red *Cirrostrati* at sun-rise, with hoar frost: fine day, with *Cirrostratus* in flocks: *Cirrocumulus*, and *Cirrus*, with a rainy aspect. 21. Gloomy overcast morning: some wind and rain by nine: afterwards fine with *Cumulus*, and a breeze from NW: lunar halo. 22. Fine: windy, p.m.: in the fore part of the night, a heavy southerly gale, with showers. 23. Fine, windy: the barometer fluctuating: lunar corona at night, the wind NW. 24. Rain very early: wet forenoon: fair p.m. and night windy. 25. Fine, a.m. with *Cirrus* and *Cirrostratus:* windy night. 27. Much wind in the night, followed by rain. 28. Large *Cumuli*, with *Cirri* above, and the rapid developement of *Cumulostrati*, presented this afternoon a spring-like sky. 29. Hoar frost: fair day: a thickness to the S and W p.m. was followed by a nocturnal gale, with rain, as usual of late.

RESULTS.

Winds Westerly, introduced by the South East.

Barometer:	Greatest height	30·43 in.
	Least	28·98 in.
	Mean of the period	29·786 in.
Thermometer:	Greatest height	53°
	Least	21°
	Mean of the period	38·46°
	Mean of the hygrometer	78·5°
	Rain	2·32 in.

Character of the period, stormy and changeable: amidst a succession of gales of wind, there were many intervals of fine weather by day; and, as the thermometer shows, of frost by night.

Edinburgh, Jan. 3. — Notwithstanding the severe and continued frost, very little snow has hitherto fallen: excepting a little between Newcastle and Berwick, where it may be six inches deep in some places, there is none to be seen on the whole line of road from London.

STORMS OF WIND.

Edinburgh, Jan. 14. — On Monday night (12th) we were visited by one of the most severe gales we have experienced for a long time. It began to blow about ten o'clock from the south-west, accompanied with heavy rain, and continued to increase during the night until it became a perfect hurricane.

Edinburgh, Jan. 17.—Thursday morning (15th) the barometer had fallen eight-tenths of an inch; it then blew very hard, and during the whole course of the day slates and chimney-pots were flying about in all directions.—In the evening the gale increased, and about five o'clock it blew a perfect hurricane. In houses fronting the west a good deal of mischief was done in breaking the panes of glass, stripping the lead from the roof, dashing the cupola windows from their frames, and shivering them to atoms. In the course of the forenoon, two of the small minarets on the top of St. John's Chapel, at the west end of Prince's-street, gave way, and fell without doing any material damage to that beautiful building; not so, however, the effects of the evening—the violence of the wind carried off the whole of the minarets, large and small, leaving the summit of the tower a perfect ruin. Such was the force of the wind, that the masses of masonry were carried 30 feet beyond the base of the tower, penetrating not only the roof of the church, but also the floor, and breaking through the vaults to the foundation. One of the solid bars or bats of copper by which one of the pinnacles was bound to the top of the tower, was above an inch broad, and 5-6ths of an inch thick; and though the pinnacle to which it belongs was only six feet high, with a medium breadth of about eight inches, so as to expose a surface of merely four square feet, yet such was the power of the wind, that it tore the copper bar from its place, and twisted one of its arms, which was eight inches long, through an arch of 90 degrees, as if it had been a slender piece of lead. This effect resembles more that which is sometimes produced by lightning than by any other agent.

LARGE METEOR.

A beautiful meteor, with a long train, was observed at *Campbletown*, near Fort St. George, (Highlands,) at six o'clock on Wednesday (Jan. 28?). To the naked eye, the diameter of the ball appeared to be about one foot, and the length of the train about six feet. Its course was from West to East.—*Pub. Ledger.*

A violent storm was experienced at *Hamburgh* on the 15th Jan. accompanied by hail and rain. The Elbe rose so high, that all the lower part of the town was inundated, and the streets could only be passed in boats. Much damage was sustained, and melancholy accouuts were expected from sea.

Feb. 5.—Two Hamburgh Mails arrived yesterday. From the Papers by them it appears that violent storms, accompanied with hail, thunder and lightning, have been experienced in most of the northern parts of the Continent. At Adensee, Stettin, Konigsberg, &c. much damage was sustained.

A Letter from *Carlisle*, dated *January* 24, says:—During the week the weather has varied much; boisterous, rainy, and frosty, in succession. The Eden, Petterill, and Caldew, were much swollen by the mountain torrents.—*Pub. Ledger.*

	1818.	Wind.	Pressure.		Temp.		Hygr.	Rain, &c.
			Max.	Min.	Max	Min.	at 9 a.m.	
1st Mo.	Jan. 30	W	29·23	28·85	44°	33°	70	7
	31	SW	29·23	29·09	39	29	63	18
2d Mo.	Feb. 1	Var.	29·09	28·94	41	24	74	—
	2	NE	29·10	28·94	32	20	90	—
	3	NE	29·17	29·09	37	24	88	
	4	N	29·50	29·09	32	26	82	
	New M. 5	Var.	29·90	29·50	—	—	88	
	6	Var.	30·02	29·90	41	24		
	7	Var.	30·02	30·00	31	23	92	
	8	NW	30·00	29·93	33	20	89	
	9	Var.	29·99	29·93	33	23	90	
	10	E	30·15	29·99	33	25		
	11	SW	30·16	30·15	37	29	75	
	12	SE	30·16	30·05	35	30	72	
	1st Q. 13	NE	30·05	29·81	38	23	70	
	14	SE	29·84	29·72	36	25	90	
	15	E	29·88	29·80	40	27	93	
	16	NE	29·93	29·88	47	34	97	
	17	S	29·93	29·89	—	—	99	
	18	SW	29·93	29·80	49	34		23
	19	SE	29·99	29·75	51	28	95	19
	20	S	29·96	29·65	46	29	95	6
	Full M. 21	SW	29·65	29·22	45	34	72	15
	22	NE	29·73	28·94	38	28	67	—
	23	NW	29·74	29·50	41	31	72	1·62
	24	SW	29·80	29·51	49	36	61	—
	25	SW	29·51	29·37	52	35	62	—
	26	NW	29·72	29·42	42	29	72	—
	L Q. 27		29 60	29·27		34	82	57
	28		29·53	29·29	47	35	62	3
			30·16	28·85	52	20	80	3·10

NOTES.—First Mo. 30. Squally: showers, a. m.: wind and rain in the night.

Second Mo. 1. Hoar frost: rain, followed by snow in large flakes: *Cumulostratus* and *Nimbus*. 2. Hoar frost: fine *Cirri*, with *Cirrostratus*, a. m.: the lower modifications with some loose snow, p. m. 3. Fair: hoar frost. 4 Cloudy morning: snow on the wagons coming from the north, probably of last night: it seems to be the wind blowing over snow that keeps down our temperature to 32°. 5. A few drops of rain about nine, a. m.: after which very fine, with *Cumulus*, &c. and inosculation. 6. Hoar frost: misty. 7. Hoar frost: the paths icy: mist increases, with a calm air. 8. Misty: rime to the tops of the trees. 9. Misty: the rime falls partially. 10. Misty till evening, when it cleared up, and the rime fell off. 11—15. Hoar frosts, with fine weather: *Cumuli*, &c.: on the 15th a few drops of rain. 16. Very fine, with *Cumuli*, &c.: at seven, p. m. a large faint lunar halo. 17. Fine, with *Cirrocumulus*, &c. 18. Windy: wet, p.m. 19. A slight *Stratus*, a.m.: wet evening: windy night. 20. Hoar frost; somewhat misty; rain before noon: some hail in a shower at half-past one: after this *Cumulus*, with *Cirrus* and *Cirrostratus* above, the latter *imbricated*, or overlapping, like the branches of a pine-tree; then *Nimbi* amidst groups of other clouds, the lofty crowns of which were long coloured with a fine gradation of red tints about sun-set: the sky around the moon showed violet, while the disc was brassy. 21. Much wind, a.m. with clouds driving high and close; wet, p.m.: at evening a lighter sky, with *Cumulus* and *Cirrocumulus*, ending in *Cirrostratus*, with a lunar corona. 22. Morning cloudy and dark, by a large mass of smoke passing near us in the S.: rain, sleet: snow to the depth of several inches, with a very gentle breeze: moonlight evening. 23. Fair, much snow on the trees and shrubs: a strong westerly breeze: the rise of the barometer, like the previous fall, very sudden: at night stormy, with hail and much rain. 24. The snow mostly gone: elevated *Cirri*, with *Cumuli* in a pale blue sky: after *Cirrostratus* and haze at evening a gale through the night. 25. Much wind, with driving clouds: temperature 48° at nine, a.m. 26. a.m. Rain: snow in very large flakes: sleet: much water out since the late rains: rocky *Cumuli*, followed by *Nimbi* and gusts of wind, p.m.: clouds coloured at sun-set. 27. Wet, a.m.: fine evening after a rainbow. 28. Elevated *Cirri* and *Cirrocumuli* stretching NW and SE: general obscurity followed, wivh showers and wind.

RESULTS.

Winds variable: in the latter part stormy from the Westward.

Barometer:	Greatest height	30·16 in.
	Least	28·85 in.
	Mean of the period	29·975 in.
Thermometer:	Greatest height	52°
	Least	20°
	Mean of the period	34·20°
	Mean of the hygrometer	80·0°
	Rain	3·10 in.

The evaporation for this and the preceding period taken together, is 1·38 inch.

METEOR.

A large and very luminous Meteor was observed *at two o'clock in the day*, the 6th of 2d Month, from Cambridge, and from Swaffham, Norfolk, descending from the zenith towards the northern horizon, within about twelve degrees of which it disappeared.—See a letter describing it, from Professor Clarke, in Thomson's Annals, &c. vol. ii. p. 273.

TABLE CXLI.

	1818.		Wind.	Pressure.		Temp.		Hygr.	Rain,
				Max.	Min.	Max.	Min.	at9a.m.	&c.
3d Mo.		March 1	SW	29·64	29·62	47°	33°	59	18
		2	SW	29·71	29·52	48	30	65	17
		3	SW	29·35	29·25	50	32	82	14
		4	SW	28·83	28·50	47	36	72	22
		5	SW	29·20	28·83	44	34	60	—
		6	S	29·39	29·09	46	30	64	26
	New M.	7	S	28·88	28·70	49	37	75	37
		8	W	29·33	28·88	47	31	58	3
		9	W	29·36	29·26	43	28	55	—
		10	W	29·42	29·24	42	29	60	—
		11	NW	28·84	28·80	44.	30	54	—
		12	NW	29·26	28·84	45	32	62	36
		13	N	29·80	29·26	43	28	69	—
		14	SW	29·80	29·45	45	35	68	—
	1st Q.	15	W	29·32	29·15	45	33	68	—
		16	NW	29·68	29·32	48	34	67	12
		17	W	29·98	29·68	52	37	58	
		18	SW	29·95	29·93	52	43	56	
		19	SW	29·95	29·58	52		59	—
		20	NW	29·88	29·58	45	28		
		21	SW	29·88	29·57	51	35	66	19
	Full M.	22	SW	29·57	29·22	50	42	80	68
		23	SW	29·60	29·22	49	34	78	9
		24	SW	29·70	29·49	50	31	65	38
		25	NW	29·77	29·45	48	27	68	—
		26	Var.	29·06	29·15	39	33	77	55
		27	NE	30·26	29·96	45	27	64	1
		28	SE	30·26	30·12	49	35	63	
	L Q.	29	S	30·13	30·05	49	27	53	
				30.26	28·50	52	27	65	3·75

Notes.—Third Mo. 1. *Cirrocumulus* followed by *Cumulus* and *Nimbus:* squalls with hail and rain: the bow at nine, a.m. and again at three, p.m. 2. Fine, a.m. with clouds, as yesterday: wet, windy, p.m. 3. Hoar frost: fine, a.m.: clouds and wind, p.m.: rain, with large hail in the night. 4. Fine morning: the barometer, which had gone somewhat lower than here noted, rising abruptly: having risen about four-tenths, it took to falling again rapidly: there was a complete overcast sky (with haze in broad streaks, converging in the SW, and scud moving swiftly under it) till dark; it now began to rain, and the wind rose to a greater degree of violence than for some years past, raging thus from SE and SW till past midnight; when it abated, the barometer appears to have turned to rise more abruptly than before, having gone down an inch in 15 hours (the actual lowest point 28·35 inches); there is said to have been much thunder and lightning after midnight; the barometer fell, not uniformly, but by fits, at intervals of about a quarter of a minute, as the more violent gusts of wind came over. 5. Fine, a.m.: squally, with hail and rain, p.m. 6. The same. 7. Wet, stormy: much wind at night, with lightning far to the S and SE. 8. Fair, with *Cirrus* and *Cumulus:* the latter crossed with streaks of *Cirrostratus: Nimbi* succeeded, with showers: windy night. 9. Fair, with wind and *Cumulus*: the clouds assume a more tranquil aspect: a little snow this evening. 10. Some fine specimens of *Nimbus* to-day, from which a very little snow fell; clear night. 11. *Cirrus:* windy: in the night some rain, followed by snow from the N. 12. The ground covered with snow: *Cirrus*, followed by *Cumulus* and *Nimbus*: showers. 13. Rain, snow, and sleet, early: various modifications of cloud to-day: at night, a few drops. 14. Hoar frost: some rain, p.m. and evening: lunar halo. 15. Windy: some showers. 16. Various modifications of cloud, a.m. ending in *Nimbus*, and a shower with hail, p.m.: at night, calmer than of late, with a lunar corona. 17. Fair, a.m.: turbid sky above, with *Cirrus*, *Cirrostratus*, &c.: windy. 18. Close *Cumulostratus* most of the day: windy at night. 19. *Cumulus*, with *Cirrus*: windy, p.m. tending to S: a little rain in the night. 20. The clouds gradually thickened, as for rain; but a brisk wind carried them off to the SE: hygrometer at five, p.m. 36°. 21. Hoar frost: the roads dusty: showers, p.m. 22. Some showers, with hail from NW: fine, p.m.: all night a hard gale from about SW with rain. 23. Morning wet, and stormy: fine, with clouds, (among which was the *Cumulus* capped), p.m.: night, pretty calm. 24. Fair, a.m.; then a hail shower: much wind, with rain, in the night. 25. Some hail showers: large *Cumuli*, *Nimbi*, &c. 26. A steady rain from SE, with little wind, a.m.: the rain ceasing, p.m. the wind went by S to NW, and so probably by N to NE, where it was on the morning of the 27th, the barometer having risen rapidly with a uniform motion: a shower, p.m. 28. Fair, gloomy. 29. Fair, with *Cumulus* and *Cirrostratus*.

RESULTS.

Winds Westerly.

Barometer:	Greatest height	30·26 in.
	Least (observed)[1]	28·50 in.
	Mean of the period	29·47 in.
Thermometer:	Greatest height	52°
	Least	27°
	Mean of the period	39·70°
Mean of the hygrometer		65°
	Evaporation	1·10 in.
	Rain	3·75 in.

Character of the period for the most part tempestuous, with frequent rains, the barometer running through a series of sharp depressions till near the close, when it suddenly assumed the elevation of fair weather. Almost all the showers, from the first, were more or less mingled with hail.

The storm of the 4th of Third Mo. appears to have been felt over the whole of South Britain, and to have been attended with much damage and loss of lives both by sea and land. I annex extracts from the papers, sufficient to shew its prevalence on many distant points of our island at the same time. In a letter which I received soon afterwards from Dr. William Henry of Manchester, its effects are thus mentioned: "On the evening of that day (the 4th,) we had a violent storm of wind from the SW, which did considerable damage. It began about eight, p. m. and continued with increased violence till three or four in the morning of the 5th. Near Macclesfield it was so violent, that the London mail to this town was detained there from eight, p. m. till five, a. m., and did not arrive here till ten hours after its usual time." The Barometer, it appears, fell on this occasion, at Manchester, to 28·20 in.; the highest *temp.* of the day 44°. The lowest point it attained with us (28·35 in.) was ascertained by means of the registering clock, from which I was not at that time in the practice of taking off the results for publication.

On the subject of the Barometer Dr. Henry adds, "My father once remarked it below 28 inches, and was greatly surprised that no rain followed. Several weeks afterwards he learned that a violent earthquake had been felt at that time, I think in Sicily." I introduce this remark, because it is probable most of my readers would be induced to attribute to a similar cause the phenomenon of a retrograde movement of the tide at *Hull*, which I annex, as I found it described in the public papers. It appears that in the afternoon of the 4th of Third month, the tide on that coast having turned to ebb, suddenly flowed again for a short time and to a greater height than before: in the early part of the morning of the 5th on the contrary, the depth of high water in the dock fell short considerably. Now, if we suppose this gale of wind arriving suddenly from the *Southward* (which by comparing the times of its beginning at Ryde, Isle of Wight, and at Manchester and Yarmouth, appears to be the fact,) a *swell*, produced by the compression of the water in the channel and straits of Dover, may have been propagated on the surface of the sea Northward, with greater swiftness than the storm could make its way (as far as regards its action on the face of the earth) across the land to Hull. The arrival of this swell at the critical time of the tide's turning accounts for the first fact. With regard to the second, it is matter of historical record, that an *off-shore* wind, (as this was at Hull,) if it blow long enough, and with sufficient force, may so remove the sea from the coast as to suspend a whole tide and give opportunity to the estuary of a considerable river to run itself empty: as has happened, I think more than once, to the Thames. Portsmouth and Hull were therefore placed on this occasion, by the operation of the same cause, in opposite circumstances: the one had "the highest spring tide ever remembered," and the other, a tide later, near five feet less water than was expected.

On Wednesday night (March 4th,) the Metropolis was visited by a storm more violent than any we remember for some years past. The wind began to blow from S to SW about eight o'clock, a perfect hurricane, accompanied with rain, and at times with lightning, and raged with increasing fury until near one, when a temporary abatement took place, which was followed by occasional squalls till between three and four o clock. We regret to learn, that this tremendous storm has been productive of considerable damage in various parts of the town.—*Pub. Ledger.*

Yarmouth, March 5.—A most tremendous gale of wind from the S to the SE, with rain, came on about eight o'clock last evening, which continued with increasing violence all night, and has done considerable damage to the shipping on this part of our coast.

Deal, March 5.—Last night it came on to blow a most tremendous gale from the South, and continued nearly the whole of the night with unabated violence; at midnight it blew a complete hurricane, accompanied with thunder and lightning, during of which, several vessels in the Downs suffered.

Portsmouth, March 5.—It blew a tremendous hurricane last night from S and SSE, accompanied with the highest spring tides ever remembered.

Ryde, March 5.—One of the severest gales of wind that has been felt here for the last thirty-seven years was experienced last night: it commenced about half past four p.m., and continued with increased violence until past eleven, during which time the greater part of the pier and several houses were demolished. The supposed damage is estimated at between four and five thousand pounds. No lives were lost, nor any damage done to the shipping.

Dartmouth, March 5.—We experienced a perfect hurricane last night at SSE, from six to ten p.m.

Exmouth, March 6.—On the 4th instant, between seven and eight o'clock in the evening, we had a most tremendous gale of wind about SSE, with dreadful rain, thunder, and lightning.

Falmouth, March 4.—At day-light this morning the wind was from the WSW, moderate, about eleven a.m. it backened to the S, and from that to SSE, and since that time to the present moment (ten p.m) it has blown a hurricane, with a heavy sea in from that quarter.

Penzance, March 6.—We had a very heavy gale here on Wednesday the 4th inst. from S to SSW.

Milford, March 6.—On the 4th inst. it blew a very heavy storm from SW to WNW.—*Shipping List.*

Leicester.—Wednesday night (Mar. 4) was one of the most boisterous recollected for years past; much damage has been sustained in this town, and many parts of the county.

Hull.—The following phenomena were observed here on Wednesday the 4th March. At high water, about 30 minutes past four o'clock in the afternoon, the wind then blowing from the SW, with moderate weather, the tide flowed at the Old Dock Gates 18 feet 6 inches. After the tide had fallen from one to two inches, the Dock Gates closed as usual with the ebbing of the tide, which then began again to flow to the height, as near as can be calculated, of four or five inches, thereby opening the gates again; and continued flowing a sufficient time to allow one ship and several small vessels to pass into the dock, before it again began to fall. The tempestuous night of Wednesday ensued; the wind blew a heavy gale still from the SW, and at high water, at five o'clock on Thursday morning, the tide flowed 14 feet 1 inch; being 4 feet 5 inches less than on the preceding evening; although from the spring tides having put in, the water ought, according to the usual state of things, to have flowed higher than on the Wednesday evening.

Plymouth, March 5.—At the commencement of the winter a few large stones were placed by themselves on the top or finished part of the Breakwater, to see if they would stand the winter gales: they stood all but this last, and this morning I found them washed from the top, and lying on the North Slope. There were three of them, one of *nine tons*, and the other two of five tons each: they will be replaced as soon as possible, for further trial.

Plymouth.—The effects of the late thunder storm of the 4th March, on a fir tree belonging to W. Langmead, Esq. at Elfordleigh, in the neighbourhood of Plymouth, are too singular to be omitted, and perhaps the most extraordinary ones that ever occurred in this county on such an occasion. The tree, in question, has been long admired for its size and noble proportions, being more than 100 feet high and nearly 14 feet in girth: but it exists no longer, having been literally shivered to pieces by the electric fluid. Some of the fragments lie 260 feet from the spot, and others bestrew the ground in every direction, presenting altogether a scene of desolated vegetation, easier to be conceived than described.—*Papers.*

	1818.		Wind.	Pressure.		Temp.		Hygr.	Rain,
				Max.	Min.	Max.	Min.	at 9a.m.	&c.
3d Mo.		March 30	SE	30·30	30·13	53	35	71	—
		31	NE	30·25	30·20	44	35	64	—
4th Mo.		April 1	NE	30 25	30·13	47	35	55	
		2	NE	30·32	30 23	47	38	64	
		3	NE	30·37	30·32	45	32	52	
		4	SE	30·32	30·02	49	22	50	
	New M.	5	SW	30·02	29·22	54	40	63	4
		6	SW	29·67	29·22	51	34	73	—
		7	Var.	29·67	29·40	56	33	67	65
		8	S	29·40	29·24	63	48	61	25
		9	SW	29·50	29·24	56	40	61	6
		10	S	29·50	29·16	55	42	70	17
		11	NW	29·92	29·16	56	33	54	22
		12	W	30·02	30·00	47	27	55	2
	1st Q.	13	SE	30·00	29 65	53	33	55	·
		14	SE	29·69	29·63	59	28	53	
		15	SE	29·63	29·34	60	28	69	
		16	SE	29·34	29·20	57	47	52	16
		17	E	29·30	29·20	54	42	77	—
		18	NE	29·66	29·30	50	32	50	
		19	E	29·72	29·66	53	26		
	Full M.	20	Var.	29·72	29 63	54	28	55	
		21	E	29·66	29·62	57	40	48	
		22	SE	29·62	29·45	58	43	53	—
		23	E	29·45	29·24	46	42	80	81
		24	NE	29·24	29·08	53	42	75	52
		25	SW	29·35	29·08	58	42	65	5
		26	Var.	29·35	29·25	68	52	60	14
	L. Q.	27	SW	29·75	29·25	65	44	60	—
				30·37	29·08	68	22	61	3·09

Notes.—Third Mo. 30. Hoar frost: a breeze, variable, succeeded by *Cirrus* mingled with *Cumulus:* a few drops, p. m. 31. Fine breeze: large *Cumulostrati*, with a few drops of rain: clear twilight.

Fourth Mo. 1. Fine: *Cumulus* passing to *Cumulostratus* in a brisk wind: at sun-set an evaporation of the clouds, followed by dew and an orange twilight. 2. Cloudy morning: *Cumulostratus* carried in a brisk wind through the day. 3. As yesterday, with the addition of red *Cirri* at sun-set. 4. Much sun, with long, faint, linear *Cirri.* 5. Hoar frost: calm: a warm sun, with much dust: *Cirrus* increased to obscurity in the evening, and it rained by night. 6. A gale through the day: calm night. 7. Wet, a. m. from the eastward: p. m. rain from the SW: a gale in the night. 8. Turbid sky: *Cirrocumulus* at nine, a. m. with the temp. 56°: afterwards, the wind southing, we had showers at intervals, and a gale by night. 9, 10, 11. Windy, with showers. 12. *Cumulostratus* chiefly, but with rain at intervals: in the evening the wind went to NW, with large *Nimbi.* 13. Fair, with *Cumulostratus.* 14. In the evening a large, faint, lunar halo, on a kind of *Cirrose* obscurity spread from NW towards the zenith. 15. Hoar frost: fine sky, with tendency to *Cirrocumulus.* 16. Hoar frost: *Cirrocumulus* by nine, a. m. in extensive beds: a smart breeze came on, with *Cirrostratus* and fleecy *Cumulus*, and *the first swallow* made its appearance about five, p. m.: rain ensued after dark, with a fragrant smell from the turf. 17. Drizzling morn: fine day. 18. Windy, overcast, bleak morning: fine day. 19. *Cumulostratus*, windy. 20. Hoar frost: fair, with clouds; in the evening a westerly current was evident above, by the motion of elevated *Cirrostrati:* two different beds of this cloud had appeared at sun-set, crossing at an oblique angle in the S: the eclipse of the moon was well seen at intervals through these. 21. Little wind: fair. 22. Wet, p. m. 23. Very wet, a. m. and again, with wind, at night. 24. Overcast day: wet evening and night. 25. Some drizzling rain, after inosculation of heavy *Cumuli* with a stratum of clouds above. 26. Fleecy *Cumuli*, with *Cirri*, and tendency to *Nimbus* in the S: at nine, a. m. an unusual agitation, evidently electrical, was produced in a *Cirrus*, by the passage beneath it of fleecy *Cumuli*, which came from S, with the vane at E: thunder clouds soon after formed, and before one p. m. we heard three distinct explosions; two successive showers of rain mixed with hail followed, but without wind: in the evening, large thunder clouds continuing about, it lightened for some hours in the distance, nearly all the horizon round, the W only being free from it: the wind SE. 27. Cloudy, wet morning: windy at SW: fine afterwards, with large *Cirrus* above *Cumulus:* some lightning at night in the NE.

RESULTS.

Winds Variable, with much South East.

Barometer:	Greatest height	30·37 in.
	Least	29.08 in.
	Mean of the period	29·642 in.
Thermometer:	Greatest height	68°
	Least	22°
	Mean of the period	45·36°
Mean of the hygrometer		61°
	Evaporation	1·40 in.
	Rain	3·09 in.

The excessive rains continuing, have occasioned repeated overflowings of the river Lea into the marshes. Vegetation, which continued nearly dormant at the commencement of this period, was making considerable progress towards the close of it.

A *Tornado* occurred in the county of Middlesex at the time of the thunder-storm, which I have noticed (Fourth Mo. 26,) as preceded by an unusual demonstration of electricity in the clouds. It was observed by Col. Beaufoy from Bushey Heath, near which its course terminated, after proceeding in a direct line about five miles in 20 minutes, but probably moving in its circular whirl with more than five times that velocity. In its course it uprooted trees, unroofed houses, threw down walls, and in short removed every thing that impeded its progress; being visible by means of the inverted cone of cloud occupying its interior. See Thomson's Annals of Philosophy, vol. xi. p. 442, &c.

A tremendous storm of hail and rain, accompanied by thunder and lightning, fell at Hampstead on Sunday, April 26, at half-past eleven, and the effects were severely felt at Hendon and the adjacent villages. Upwards of twelve large trees were blown down at Hendon. At one o'clock its effects were felt at Dunstable, Redburn, and Market-street, where the hailstones were so large as to break the church windows, &c. The accounts from various parts mention the dreadful effects of this storm.—*Pub. Ledger.*

A Letter from *Boston*, dated April 28, says,—From eight until eleven o'clock on Sunday night, this town and the neighbourhood were visited by a most dreadful storm of thunder and lightning; when the latter was more extensively diffused than any that has been witnessed in this part of the kingdom since the month of July 1809. An old man, who has travelled in the East, says, 'He has seen such lightning before in India frequently—in England never.'—*Pub. Ledger.*

HAIL STORMS IN FRANCE.

The French Journals continue to give deplorable accounts of the ravages in the departments of the Saone and Loire, occasioned by dreadful hail storms. The hail-stones are described as being as large as pullet's eggs. The game was every where found dead in the fields; and several persons were severely wounded by the hail. In one vineyard alone, between Orleans and Beaugency, the damage done by the storms is estimated at 4000 pipes of wine.—*Pub. Ledger, May* 16.

ICE IN THE ATLANTIC.

Capt. Quereau, of the Grand Turk, which has arrived at Derry from New York, states, that on the 15th of February, in latitude 43, he passed through several islands of ice, some miles in extent, and from 3 to 400 feet high The ship, with strong westerly gales, was two days in getting clear of them.—*Pub. Ledger.*

The Speedy Packet, arrived from New York, saw, on 28th March, in lat. 45. 32. long. 46. 20. an island of ice, the summit of the peak of which was, on a moderate calculation, 400 feet above the surface of the water; and in lat. 45. 36. long. 48. 00. W. passed two more, the largest of which, was 250 feet above the sea and three quarters of a mile in length.—*Shipping List.*

The ships arriving from the westward continue to report having seen immense masses of ice. The Minerva, from New York, in lat. 41. 50. N. lon. 50. W. passed a number of islands of a height of from 150 to 200 feet. The Washington too saw several fields of ice, in lat. 42. W. long. 48. 20.—*Pub. Ledger, May* 25.

TABLE CXLIII.

	1818.	Wind.	Pressure.		Temp.		Hygr.	Rain,
			Max.	Min.	Max.	Min.	at 9 a.m.	&c.
4th Mo.	April 28	SW	29·98	29·80	53	30	53	
	29	NE	29·98	29·75	65	41	50	
	30	Var.	29·88	29·75	53	48	70	51
5th Mo.	May 1	SW	29·88	29·70	60	35	56	5
	2	Var.	29·85	29·45	69	47	52	39
	3	SW	29·48	29·36	66	43	75	3
	4	NW	29·48	29·40	67	42	58	
	New M. 5	NE	29·40	29·26	65	48	62	18
	6	NE	29·26	29·22	65	45	72	31
	7	SW	29·51	29·26	62	43	63	—
	8	S	29·51	29·40	65	44		1·46
	9	SW	29·84	29·51	60	45		2
	10	SW	29·84	29·67	64	37	50	—
	11	S	29·67	29·57	67	49	43	2
	12	NW	29·63	29·45	66	40	44	15
	1st Q. 13	SE	29·45	29·30	61	41	59	10
	14	S	29·47	29·30	58	39	57	1
	15	NW	29·52	29·47	63	41	46	—
	16	N	29·65	29·52	63	50	45	5
	17	NW	29·87	29·65	61	44	75	
	18	N	30·00	29·87	69	47		
	19	NE	30·05	30·00	57	38		
	Full M. 20	E	30·20	30·05	65	45		
	21	E	30·23	30·20	59	36		
	22	E	30·32	30·23	61	42		
	23	NE	30·35	30·32	61	37		
	24	SE	30·35	30·25	63	44		
	25	NE	30·26	30·25	65	40		
	L. Q. 26	NE	30·33	30·23	69	42		
			30·35	29·22	69	30	57	3.28

Notes.—Fourth Mo. 28. Much dew: at nine a. m. a brisk wind carrying *Cumuli*, above which appeared beds of *Cirrus* and *Cirrocumulus*, moving from SE: a fine day ensued, with *Cumulostratus*. 29. Fine. 30. Overcast early, with the wind NE; after which wet till evening.

Fifth Mo. 1. A fine day, save a shower or two. 2. Large *Cumuli* rose, which, in the E especially, mingled and inosculated with *Cirrostratus* above; I suspected thunder in that direction: at sun-set, *Cirri* from N to S, above *Cirrostrati* ranging E and W: rain by night. 3. Drizzling, a. m.: fine, with *Cumulus*, and *Cirrus* at mid-day: in the evening, heavy showers appeared to the N and NE, with much

Cirrostratus overhead. 4. Very fine, with *Cumuli*, and large, plumose *Cirri* stretching E and W; the clouds, though heavy, dispersed at sun-set. 5. Sunshine at six a. m., with a few *Cirri*, &c.: before seven, a sudden mist came on from the E and NE, which obscured the view of the *Solar Eclipse* during the middle half hour of the time; the dew lay on the grass till noon, in the sunshine, and large *Cumuli* formed, inosculating with the clouds above: at two p. m. some heavy showers fell, but so local, that the road, half a mile off to the S, remained dusty: in the evening, *Nimbi* appeared in thunder-groups to the SE and S, and, finally, more extensive rain came on, with the wind SE. 6. Rain, a. m., and at night.

RESULTS.

Winds variable.

Barometer:	Greatest height	30·35 in.
	Least	29·22 in.
	Mean of the period	29·766 in.
Thermometer:	Greatest height	69°
	Least	30°
	Mean of the period	52·84°
	Hygrometer (mean of 18 days)	57°
	Evaporation	1·70 in.
	Rain	3·28 in.

Having left home on a journey on the morning of the 8th of Fifth mo. I did not witness a very uncommon fall of rain which took place in this neighbourhood. It commenced early in the evening of that day, and lasted about 12 hours. Near an inch and a half of water descended in the above space of time, which, taking the shortest course from the higher ground to the hollows, filled the latter several feet deep, and overflowed the roads, in several places not usually subject to this accident. Much inconvenience, and some loss of property, ensued, the particulars of which were detailed in the newspapers of the subsequent days. This heavy rain seems to have been connected with a change in the general current, which, after a few days further continuance of unsettled weather, became established from the northward, the barometer assuming a high level, and the earth drying rapidly. It was, indeed, a singular spectacle to behold the ground saturated with water, and every spring running, up to so late a period in the season as the middle of the fifth month, when our fields are commonly dry enough, in every situation, to admit of the soil being pulverised by the harrows.

WEATHER ABROAD.

About the end of April parties in sledges were still making at *Stockholm*; at *Petersburg* the people were walking and driving carriages on the ice of the Neva; while but a few days later they were complaining of the heat at *Vienna*.

According to a letter of the 10th ult. from *Lisbon*, the weather there had been for some weeks excessively cold and rainy.—*Pub. Ledger*, *June* 1.

TABLE CXLIV.

	1818.		Wind.	Pressure.		Temp.		Hygr. at 9a.m.	Rain, &c.
				Max.	Min.	Max.	Min.		
5th Mo.		May 27	NE	30·23	30·13	67	39		
		28	NE	30·13	30 09	69	44		
		29	NE	30·13	30·01	63	41		
		30	NE	30·02	29·90	65	33		
		31	NW	29 97	29·90	74	51		
6th Mo.		June 1	NW	30 00	29·97	77	57		
		2	W	30·05	30·00	80	43		
	New M.	3	W	30·14	30·05	80	45		
		4	SE	30 30	30·14	82	45		
		5	E	30·33	30·30	79	43		
		6	NE	30·33	30·25	78	45		
		7	SE	30·27	30·18	77	52		
		8	SE	30·27	30·23	75	49		
		9	SE	30·23	30·20	75	46		
		10	SE	30·21	30·10	80	50		
	1st Q.	11	SE	30·10	29·98	84	47		
		12	E	29·98	29·85	88	51		
		13	NW	29·93	29·82	89	58		3
		14	NW	30·07	29·93	75	49		—
		15	SW	30·05	29·92	78	55		—
		16	SW	29·92	29·75	78	59		
		17	SW	29·70	29·67	74	54		6
	Full M.	18	NW	29·79	29·69	75	49	50	—
		19	SW	29·79	29·53	72	52	45	2
		20	SW	30·00	29·60	72	46	47	1
		21	SW	30·00	29·75	71	56	43	6
		22	SW	29·76	29·64	71	50	62	25
		23	NW	29·87	29·76	71	53	44	
		24	NW	30·09	29·77	74	52	47	—
	L. Q.	25	SW	30·09	30·02	79	56	52	
				30·33	29·53	89	33	48	0·43

Notes.—Sixth Mo. 6. Since this period came in, the weather has afforded little variety. The days have been serene, with breezes, which commonly increased with the temperature, and died away at sun-set: the nights nearly calm, with dew, and a peculiarly clear, but not high-coloured twilight. Thunder clouds have shown themselves at intervals in the horizon; and to-day there are large plumose *Cirri*. 8. My brother observed, about nine, p. m. a bright, blue meteor descending from the zenith to the NW. 10. After sun-set, some beautiful diverging shadows on a pure, dilute, carmine tint in the NW. 11. Thunder clouds about. 12. A thunder group in the N and NW: the *Cirrostratus* for a short time assumed the form of the *Cyma*, and several discharges were heard while the *Nimbi* expanded their crowns within view: after this, it lightened in some clouds to the SE. 13. *Cumuli*, mingled with haze and *Cirri*, were followed in London by a smart thunder shower; while at Tottenham there fell but little rain: a lunar corona ensued. 14. A little rain, a. m.: a large, faint lunar halo. 15. A few drops at evening. 16. Cloudy: a strong breeze. 17. A light gale, with a rainy sound, and much cloud; but the showers proved scanty. 18. Much cloud, chiefly *Cumulostratus*: after some light showers, and appearances of rain and thunder to the southward, the twilight cleared up orange. 19, 20. Windy, cloudy: light showers; *Cumulus*, *Cirrocumulus*. 21. *Cumulus*, with the lighter modifications above, increased to obscurity: wind through the day, and small rain, evening. 22. Windy, cloudy morning: this day more decidedly showery. At eleven p. m. a shooting star descended to the SE. 23, 24. More calm, with summer clouds in various modifications. 25. A very slight rain, a. m. followed by fine blue sky, and various clouds carried by a strong breeze.

RESULTS.

Winds in the fore part light and Easterly, in the latter part Westerly and stronger.

Barometer:	Greatest height	30·33 in.
	Least	29·53 in.
	Mean of the period	29·998 in.
Thermometer:	Greatest height	89°
	Least	33°
	Mean of the period (at the Laboratory)	62·36°
	Mean of the hygrometer (the latter week)	48°
	Evaporation (a few days estimated)	4·50 in.
	Rain	0·43 in.

The clear hot sunshine of the greatest part of this period had the effect of establishing the summer in our climate in a manner to which we have long been unaccustomed. The deeper green of the foliage and the richer colour of many flowers in particular presented a striking contrast to their appearance during the last two seasons; while the soil, parched and cracked over the whole surface of our loamy meadows, bore ample testimony to the continued receptive power of the atmosphere. Yet (to use a familiar phrase) *the turf did not burn*, probably in consequence of the supply of moisture still left at a certain depth in the soil.

ICE ISLANDS IN THE ATLANTIC.

The Albion, Davis, arrived at Amboy in 45 days from North Wales, saw, June 11th to 18th, from lat. 46. lon. 46. to lat. 43. lon. 52. upwards of 40 islands of ice, many of them very large.—*Pub. Ledger.*

TABLE CXLV.

	1818.		Wind.	Pressure.		Temp.		Hygr.	Rain,
				Max.	Min.	Max.	Min.	at 9a.m.	&c.
6th Mo.		June 26	SW	30·05	29·95	79	49	47	
		27	SE	29·95	29·67	84	55	43	—
		28	SW	30·17	29 75	72	52	44	20
		29	Var.	30 26	30·17	81	51	43	—
		30	NW	30·26	30·15	84	52	43	—
7th Mo.		July 1	NE	30·15	30 02	81	52	42	—
		2	Var.	30·22	30·10	73	44		
	New M.	3	NW	30·22	30 06	79	57	45	
		4	N	30·06	30·04	77	52		
		5	NE	30·10	30·04	79	51	46	
		6	SE	30·10	30 00	84	52	45	
		7	SE	30·00	29 80	81	56		
		8	NW	30·11	29 80	74	50	46	
		9	NW	30·11	30·10	78	53	45	
		10	Var.	30·10	29·95	76	55	42	
	1st Qr.	11	SW	29 95	29 76	79	50	42	33
		12	NW	29·85	29·76	74	57	70	1
		13	N	30·20	29·85	77	52	52	
		14	NW	30 32	30·20	83	57	52	
		15	Var.	30 32	30·28	86	53	47	
		16	NE	30·28	30·18	88	62	45	
	Full M.	17	E	30 20	30·09	82	52	53	—
		18	SE	30·09	29·91	84	57	50	
		19	NW	29 95	29·88	85	59	50	
		20	Var.	29·95	29·92	76	52	55	
		21	NW	30·05	29·95	80	56	45	
		22	SW	30·13	30·05	84	55	45	
		23	SE	30·13	29·83	83	60	47	
		24	SE	29·83	29·80	93	61	40	9
				30·32	29·67	93	44	47	0·63

NOTES.—Sixth Mo. 27. It is said to have been misty early. Some remarkable, rapid changes in the electrical state of the clouds took place, the wind being brisk, veering from SE to SW. *Cirri*, passing to *Cirrocumulus* and *Cirrostratus*, grouped like the ribs of a vessel, on a kind of keel presenting downwards; very dense and magnificent. With these were mingled the rudiments of *Nimbi*, one or two of which formed in sight, and probably discharged to the NE of us: a few drops fell, and there were distant thunder storms in different directions at night. 28. Some fine rain, a. m.: several short, heavy showers about noon: inosculation, and gray sky, evening. 29, 30. Fine, with large *Cirri* above *Cumuli*: some drops of rain.

Seventh Mo. 1. A fine display of *Cirrocumulus*, with a specimen of *Cirrostratus* resembling the grain of wood: also large plumose *Cirri*, p.m.: *Cumulostratus*, and a few drops, evening. 2, 3. Exhibitions of the lighter modifications variously interchanging and mingling, succeeded by *Cumulostratus*. 4. Windy morning, overcast with *Cumulostratus*: a fine day: twilight coloured, with diverging shadows. 5. Very fine day: *Cirrocumulus* above *Cumulus* producing beautiful clouds by inosculation. 6. At *three* this morning, in the NE, a most extensive orange twilight, in the form of a pyramid, resting on a base of low purple haze, occasioned by dew in that quarter. A fine day ensued, with a breeze, and *Cumuli* casting shadows in a somewhat hazy air. 7. The shadows radiating downward from clouds continue, perhaps occasioned by fine dust floating. I observed, in passing Hounslow Heath, two whirlwinds, carrying the dust in a narrow perpendicular vortex to a great height in the air, from whence it perceptibly showered down again. 8. *Cumulostratus*, after a clear morning: strong breeze and much cloud, with a few drops. 9. Clear morning, with *Cumulus*, *Cirrus*, and a breeze. About seven, p. m., setting out to return from London, I saw, in the NW, a remarkably large *Cirrus*, composed mostly of straight, diverging fibres, extended towards the SW; and which, when I got home, had passed to *Cirrostratus*. In this cloud (as it appears) my family at the same time observed a coloured *solar halo* with two rather indistinct *parhelia*, the whole of which had escaped my notice in coming out of town. 10. A few large drops between six and seven, a. m.: close *Cumulostratus* prevailed afterwards. 11. Large *Cirri*, passing to the form of the *Nimbus*, mingled with *Cirrocumulus* and *Cirrostratus*. In the evening an extensive obscurity in the W and SW, fronted by dense *Cirrostrati*: a fresh, turfy smell came with the wind, and at length, at half-past ten, it began to rain steadily with us. 12. Wet morning: fine day afterwards. 13, 14. Fine, with *Cumuli*, &c. dew, and orange twilight. 15. A *Stratus* last night: thunder-clouds about: the moon bright gold colour, crossed by fine streaks of *Cirrostratus*. 16. The moon paler, amidst hazy *Cirrus* and *Cirrostratus*, &c. in SE. 17. Cloudy morning: light shower, then fine with *Cirrus* and *Cirrocumulus*. 18. Thunder clouds, p.m.: *Nimbi*, &c. grouped in the N. 19. Wind SE; thunder came within hearing to the NW, p. m.: temp. 85°: hygrometer 30°: not a drop of rain here, and wind NW after it. 20. Thunder groups, and rain visible to the northward: fair with us: clouds red at sun-set. 21. Wind W, a. m. *Cirrocumulus*, chiefly in strips from N to S; then *Cumulostratus*, &c. A very variously compounded and coloured sky during twilight. 22. Fleecy *Cumuli*, &c. a.m.: 23. Serene, with *Cirrus*, and fine breeze. 24. *Cirrus* and *Cirrocumulus* proceeding to electrical formations: strong breeze and slight solar halo: p.m. after the maximum of temp. was over, *Nimbi*, with thunder and lightning, approached from the south. The clouds at sun-set showed very rich crimson, lake, and orange tints; and we had showers, with a hollow wind, and lightning, till past midnight.

RESULTS.

Winds light and Variable.

Barometer:	Greatest height	30·32 in.
	Least	29·67 in.
	Mean of the period	30·037 in.
Thermometer:	Greatest height	93°
	Least	44°
	Mean of the period (at the Laboratory)	67·24°
	Mean of the hygrometer	47°
	Evaporation	4·60 in.
	Rain	0·63 in.

A period unequalled in warmth since the year 1808, when the seventh month averaged 67·19°, and the thermometer at Plaistow rose to 96°. The eighth month, 1802 (averaging 67·56°), is the only one that has *exceeded* the present in heat for 20 years past.

THUNDER STORMS.

Devonshire, July 19.—The villages of Lympstone, Exmouth, Woodbury, Otterton, Budleigh, and other places in that neighbourhood, were visited with a sudden and most tremendous storm of rain, accompanied with thunder and lightning.

July 19 a dreadful thunder-storm burst over *Stafford*. The lightning set fire to a barn at the farm of Mr. Lathbury, adjoining that town. The barn was burnt to the ground, before the progress of the flames could be arrested; and it was with difficulty that the rick-yard and house were preserved. The lightning struck the premises of Mr. Nixon, hatter, one of the Society of Friends, at the same time. The same evening a tremendous storm of rain burst over the village of *Brewood*, and the roads were momentarily impassable from the sudden accumulations of water.

The same day there was a heavy tempest at *Downham Market*, Norfolk, and in the neighbourhood; and, while the rain poured down in torrents, a ball of electric fire fell and exploded upon a new barn at Magdalen, belonging to Mr. E. Butrick, which consumed the same, together with upwards of 20 sacks of rye grass-seed, in the sacks. We have not heard of any other damage.

A most beautiful water-spout was seen at *Gainsborough*, in Lincolnshire, on Monday last, so awfully grand, as to astonish every beholder of its majestic movements and colours.—*Pub. Ledger.*

For three days lately *Gloucester* has been visited by very heavy storms of rain, accompanied by thunder and lightning; on Saturday evening, particularly, the lightning was exceedingly vivid, and the crashes of thunder awfully loud and sublime. The mast of a barge lying in the basin of the canal, was struck by the electric fluid, and splintered from the top to the bottom, a solid piece being carried away from the lower part. There were seven persons on board at the time; but though most of them felt the shock, and a handkerchief round one of their hands was burnt through by the lightning, yet none of them suffered injury.—*Pub. Ledger, July* 22.

HEAT ABROAD.

HAARLEM, *July* 31.—A good deal of damage has been done within the last week by terrible storms of thunder and lightning. Five or six farm houses in different parts of the country were struck by the lightning and totally consumed.

Accounts from *Arnheim* say—that on the 24th and 25th the heat was there from 92 to 94 of Farenheit. An equal degree of heat prevailed in those days in many parts both of Holland and Brabant.—*Pub. Ledger.*

TABLE CXLVI.

	1818.	Wind.	Pressure. Max.	Pressure. Min.	Temp. Max.	Temp. Min.	Hygr. at 9a.m.	Rain, &c.
7th Mo.	Full M. July 25	SW	29·85	29·80	77°	54°		
	26	S	29·85	29·80	84	62	45	2
	27	N	30·22	29·80	79	51	52	
	28	SW	30·27	30·22	72	47	37	
	29	SW	30·27	30·16	81	56	40	
	30	SW	30·16	30·10	82	59	40	
	31	W	30·10	29·97	80	58	46	12
8th Mo.	Aug. 1		30·18	30·03	70	50	52	
	L Q. 2	S	30·18	30·10	70	43	50	
	3	S	30·10	30·07	79	47	48	
	4	SE	30·10	30·05	87	50		
	5	E	30·03	30·00	93	57		
	6	N	30·09	30·03	88	59	40	—
	7	NW	30·10	30·07	76	52		
	8	NW	30·10	29·95	78	53		
	New M. 9		29·95	29·87	82	56	52	
	10	NE	30·20	29·95	72	43		
	11	NE	30·20	30·10	70	50	47	
	12	NE	30·13	30·07	72	46	50	
	13	NE	30·13	30·10	76	45	47	
	14	NE	30·10	30·08	71	53		
	15	NE	30·11	30·08	68	53		
	1st Q. 16	N	30·08	30·00	76	46		
	17	N	30·00	29·90	76	45		—
	18	NW	29·94	29·88	77	50		
	19	N	30·04	29·94	66	46		—
	20	N	30·04	30·03	66	50		
	21	NW	30·06	30·00	71	44		
	22	NW	30·20	30·06	66	43	39	
			30.27	29·80	93	43	45	0·14

Notes.—Eighth Mo. 4. With the exception of a gentle rain in the evening of Seventh month 31, steady fine weather has continued. Much *Cirrocumulus* has appeared of late. This day, in travelling, I observed the clouds, both at sun-rise and sun-set, beautifully coloured with a double gradation of tints, in which the successive effects of the direct and refracted rays were very distinctly marked. 6. Wind in the morning, SE, brisk, with *Cirrostratus* and *Cirrocumulus*; the latter formed in one instance out of *Cirrus* with unusual rapidity: the wind veered gradually from SE by SW to NE: at nine, p.m. a strong breeze blowing, with an appearance of rain to NW, it began to lighten: at first, a very faint blue flash; then others, gradually increasing in intensity at intervals of about a minute, filling the air, without being referrible to any point of the compass, followed generally by a sudden puff of wind, and without thunder. In twenty minutes, however, thunder began to be heard in the W and NW, and a storm passed in view to the NE, the flashes broad and vivid on the whole North horizon, and crossed by delicate striæ of a different colour. We had only a few drops of rain, and it was over in two hours. 7. The sun-set was more richly coloured with yellow (passing at length through orange to lake and purple) than I remember ever to have seen it in this tint before. It literally glowed like a bright flame on the lower surface of some dense *Cirri*, passing to *Cirrocumulus*; which modification was well marked afterwards. 9. A fine coloured sun-set again, but in deep orange passing to red, and succeeded by *Cirrostratus*. 10. Cloudy, with a brisk wind most of the day: *Cirrostratus* and dew. 11—13. Fine breeze, varying to N and E: much dew; twilight orange; and the moon pale. 14—22. Pretty strong breezes prevailed during this interval: the sky presented usually the *Cumulus* passing to *Cumulostratus;* but at intervals this modification took its character from *Cirrocumulus*, which entered into its composition from above. There was scarcely any *Cirrus*, or obscurity above the clouds, but rather a cold, transparent blue: two or three times the density of the clouds promised showers, but it always ended in a very light sprinkling. Coloured skies at sun-set were frequent; as also the appearance of diverging bars of light and shade, which I ascertained in several instances to be due to the immense quantity of *dust* constantly floating in the air. 22. This morning, being gray with *Cirrocumulus* and very cool, seemed like the commencement of autumn; and the warmth of a fire was acceptable in a north room in the evening.

RESULTS.

Winds Southerly in the fore part; Northerly, with depression of temperature, in the latter part of the period.

Barometer:	Greatest height	30·27 in.
	Least	29·80 in.
	Mean of the period	30·051 in.
Thermometer:	Greatest height	93°
	Least	43°
	Mean of the period	63·32°
Mean of the hygrometer		45°
	Evaporation, nearly	4 in.
	Rain	0·14 in.

A period unequalled in *dryness* since the beginning of 1810; when, with a *frosty* air, under a similar course of winds, and the barometer averaging 30·07 in. there fell in 30 days only 0·12 in. of rain.

WHIRLWINDS, &c.

(*Copy of a Letter to the Author.*)

SIR,

By your request I once had the pleasure of sending you an account of a luminous meteor seen by me at Peckham. Founded on this, and your curiosity in all the phenomena of our atmosphere, I presume the following may be acceptable. While sitting at a window facing the south, I observed a column of dust rising from a field that had been roughly ploughed the day before. I was surprised at the size of the column, as also at the figure that was preserved—that of a truncated cone, the base upwards, its diameter about 15 feet, its height perhaps 30 or 40 feet, and the diameter of the part next the ground rather less than a yard. At first only dust rose within it, but after about half a minute, large pieces of earth were lifted, I suppose about ten or twelve inches from the ground, one of these could not be less than the size of a man's head; this rose within the centre of the whirl. There was scarcely any wind at the time, but it moved generally in the direction of the current (at that time from the SSW,) with perhaps about half its velocity. The *largest* pieces raised (as well as the smallest) moved spirally, but these were not carried many inches. It travelled about 300 yards, and I then lost sight of it behind some trees: it was at that time increasing in height. I was within two hundred yards of it when it raised the heaviest pieces. It happened I should have told you at about noon on Tuesday, August 4, the day very hot, Fahrenheit's Thermometer at about 89° in the shade. Numerous small Cirrocumulus and dense Cirrus clouds at a very great elevation, thin streamers directed to NW, N, and NE.

The above, if at all interesting, is much at your service.

I remain, respectfully, yours,

Peckham, Aug. 5, 1818. JOHN WALLIS.

A Tornado passed over the village of *Howell*, in Lincolnshire, last week. It appeared like a body of smoke, was preceded by a small black cloud, passed very near the earth, and completely unroofed a low building, and tore the boughs from the trees as it passed, and carried them a considerable way. Coming in contact with a large ash tree, it split a piece from the trunk 12 feet long, and as thick as a man's body, carrying it at least 100 yards.—*Pub. Ledger*, *Aug*. 8.

On Friday evening (Aug. 7,) when a moment before there appeared to be a perfect calm, the inhabitants of *Croydon*, near the church, were thrown into alarm, by the sudden rising to a great height in the air, of fourteen pieces of cloth that had been pegged down in the bleach ground of Messrs. S. and T. Starey, one piece of which was so twisted round the steeple of the church, that it required a great length of time to disentangle it.

Scotland.—A singular and very beautiful phenomenon took place in the atmosphere on Saturday se'nnight, soon after the commencement of the thunder storm, immediately above the Clyde, and a little to the west of Mauldsie Castle. At one o'clock the clouds in the atmosphere seemed to rush with much rapidity to one common centre, and soon after, a large inverted cone was formed, hanging perpendicular to the horizon, which moved round upon its centre with great velocity, for upwards of six minutes. It then changed its position, and from perpendicular became horizontal; and what had formed the lower point of the cone, formed a figure like a large wheel, and rapidly turned round upon its axis, throwing off, as it were, large flakes of transparent white clouds, like wool or cotton. After moving in that position for six or eight minutes, the motion decreased, and the cone was absorbed in the contiguous clouds. A very black and dense cloud had continued moving in a south direction, to the place of attraction, during the whole time of this phenomenon (which was in all about half an hour) and very soon seemed to lose the cohesion necessary for keeping it in a body, and was seen falling down in large torrents of rain. Immediately before this phenomenon was observed, a large fire ball was seen to dart from the atmosphere, near the part which became the place of attraction.—*Edinburgh Paper.*—*Pub. Ledger*, *Aug.* 12.

TABLE CXLVII.

	1818.	Wind.	Pressure. Max.	Pressure. Min.	Temp. Max.	Temp. Min.	Hygr. at 9 a.m.	Rain, &c.
8th Mo.	L. Qr. Aug. 23	N	30·20	30·15	66	58	50	
	24	SW	30·15	30·07	71	56	42	
	25	NW	30·07	29·95	72	50	45	
	26	NW	29·95	29·75	75	55	47	
	27	W	29·75	29·60	68	60	43	10
	28	NW	29·94	29·65	73	53	52	
	29	W	29·94	29·86	80	58	48	
	New M. 30	W	30·00	29·86	76	40	52	—
	31	E	30 00	29·49	75	55	50	
9th Mo.	Sept. 1	SW	29 70	29·49	74	49	50	2
	2	SW	30·07	29·70	71	50	52	—
	3	SW	30·05	29·92	71·	61	48	—
	4	S	29·99	29·96	75	63		9
	5	W	29·96	29·70	68	55	66	95
	6	W	29·85	29·70	69	55	65	2
	1st Q. 7	NW	29·92	29·85	64	45	46	
	8	Var.	29·90	29·60	65	40	60	—
	9	NW	29·68	29·59	63	43	65	1
	10	NE	29·85	29·68	61	39		
	11	NW	30·00	29·85	60	42		
	12	NW	30·20	30·00	66	48		
	13	N	30·30	30·20	68	41		
	Full M. 14	SW	30·25	29·75	67	58		
	15	SW	29·75	29·60	59	43	50	25
	16	NW	30·10	29·60	56	39	60	12
	17	N	30·20	30·05	57	41	57	
	18	NW	30·05	29·85	63	51	72	—
	19	S	29·85	29·58	67	50		2
	20	SE	29·58	29·38	61	44	60	—
	21	SE	29·63	29·32	69	49	70	13
			30·30	29·32	80	39	54	1·71

NOTES.—Eighth Mo. 23. Morning very clear: mid-day, *Cumulus* beneath large *Cirri*: p. m. inosculation, followed by a shower to the NW, which sent us a turfy odour with the wind. 24. *Cirrostratus*, followed by *Cumulostratus*, at times heavy; the wind veered to SW, p. m. 25. Large *Cirri*, directed from SW to NE. 26. *Cumulostratus* and *Cumulus* crossed by *Cirrostratus*. 27. The hygrometer advanced to 67°: gentle rain, a. m.: cloudy, p. m. 28. *Cumulus* and *Cumulostratus*: a little rain, evening. 29. *Cirrocumulus*, beautifully coloured at sun-set, in lake shaded with violet. 30. Some very light rain, a. m.: fair, with fresh breeze after it. 31. Large plumose *Cirri*.

Ninth Mo. 1. Lowest temperature on the ground 44°. This morning from two to three, it thundered and lightened much to the SE: thunder clouds prevailed a. m.: wind SE, and a little rain: a slight shower again at night, and much dew after it: the hygrometer advanced to 80°. 2. After large *Cirri*, *Cumulostratus*, which inosculated about sun-set with a scanty *Cirrocumulus*. 3. A mixed sky, with a slight driving shower at evening: cloudy night. 4. A sweeping rain, early: hygrometer 80° at six, a. m.: much hollow southerly wind: *Cirrocumulus*, followed by ill-defined *Cirrus* with *Cumulus*; and about five, p. m. a *Nimbus*, shaped like a low circular hay-rick, with a capped *Cumulus* by its side, on the NE horizon. 5. Much rain, for the most part small and thick. 6. Wet, cloudy morning: very turbid sky: hygrometer at 80°: calm air: in the evening, inosculation of *Cumulus* with *Cirrocumulus*; after which frequent lightning between nine and ten, p. m. 7. Morning gray, with *Cirrocumulus*: sun-shine followed, with inosculation of *Cumulus* and *Cirrostratus*. 8. Large *Cirri*, with fleecy *Cumuli*: the latter attached themselves in their passage to the smoke of the city, and appeared to disperse downwards into it. Thunder clouds followed this appearance, and a smart storm passed in the S, from W to E, about five, p. m.: the crown of the nearest *Nimbus* reached our zenith, and we had a few drops; while it rained hard, with a bow in the cloud, within two miles of us. 9. Heavy *Cumulostratus*: and showers, p. m. 10. Fine breeze, with *Cumulus* and *Cirrus*; the latter survived the sun-set, and was kindled by the refracted rays with flame colour passing to red: calm at night, with hygrometer 45°. 11, 12, 13. Chiefly *Cumulus*, and *Cumulostratus* by inosculation: some fine grouping of the clouds at intervals: large *Cirri* at the conclusion. 14. A large meteor seen passing northward: windy night. 15. Cloudy, windy: hygrometer, 75°: wet, p. m. 16. Much dew: a rapid propagation of *Cirrus* from the S, followed by *Cumulostratus* and showers: during a heavy shower about nine, p. m. it thundered in the NW: the barometer stationary great part of these two days at 29·60 inches. 17—20. Windy at intervals, with *Cirrostratus*, turbidness, and driving rains. 21. Much wind, with showers: the sky turbid, and streaked with *Cirrostratus*, in a direction from SE towards NW: calm night.

RESULTS.

Wind for the most part Westerly, and moderate.

Barometer:	Greatest height	30·30 in.
	Least	29·32 in.
	Mean of the period	29·860 in.
Thermometer:	Greatest height	80°
	Least	39°
	Mean of the period	58·60°
Mean of the hygrometer		54°
	Evaporation	2·33 in.
	Rain	1·71 in.

The rains of this period, though absorbed by the parched ground as by a sponge, have completely restored vegetation in our meadows, which have resumed, in the space of a few days, a verdure equal to that of spring. Neither the natural nor the artificial indications of this change of weather were very striking: the most considerable being, probably, the sudden increase of temperature in the *nights* previous to the more considerable falls of rain.

TABLE CXLVIII.

	1818.	Wind.	Pressure. Max.	Pressure. Min.	Temp. Max.	Temp. Min.	Hygr. at 9a.m.	Rain, &c.
9th Mo.	L. Q. Sept. 22	SE	29·70	29·65	69	48	80	
	23	SE	29·65	29·53	61	53		20
	24	SE	29·68	29·60	64	48	75	—
	25	NE	29·65	29·33	65	51	66	1·22
	26	SW	29·66	29·50	61	45	98	20
	27	SE	29·65	29·52	64	54	100	—
	28	SE	29·66	29·59	73	55	85	
	29	SE	29·61	29·41	68	54		—
	New M. 30	SE	29·47	29·40	63	51		25
10th Mo.	Oct. 1	SE	29·60	29·40	66	45		—
	2	SE	29·65	29·50	68	51		—
	3	SW	29·51	29·40	66	52		90
	4	SW	29·50	29·36	66	47	61	15
	5	W	29·37	29·19	58	41	63	07
	6	W	29·50	29·25	60	32	64	
	1st Q. 7	NW	29·79	29·50	59	32	82	
	8	NW	29·88	29·79	57	34	89	
	9	NW	29·85	29·64	60	46	78	
	10	SW	29·64	29·48	63	51	71	13
	11	SW	29·71	29·40	65	46	78	23
	12	SW	29·91	29·71	61	44	65	
	13	SW	29·98	29·86	66	47	71	
	Full M. 14	SE	29·99	29·91	70	52	74	—
	15	SE	29·99	29·91	67	53	81	1
	16	SW	30·09	29·99	71	51	71	
	17	NE	30·10	29·92	68	43	79	
	18	Var.	29·99	29·92	63	47	76	
	19	NW	30·06	29·94	63	49	75	
	20	SE	30·20	30·06	61	31	71	
	21	NE	30·20	29·98	56	44	72	
			30·20	29·19	73	31	76	3·36

NOTES.—Ninth Mo. 22. *Cumuli* beneath a canopy of haze, showing as before rain, until evening, when the appearances gave place to *Cumulostratus* and red *Cirri*, followed by dispersion of the clouds, and fall of dew. 23. Much cloud, as yesterday, with wind: rain at dark. 24. Early morning wet: then fair, with various clouds, threatening rain at intervals. 25. Dew: gray sky, with the lighter modifications: overcast, p. m.: rain, evening and night. 26. Morning, wet: windy, with *Cumulus*, *Cirrostratus*, &c.: a *Nimbus* in the S, p. m.: rain after dark. 27. *Cumuli*, with an arch of *Cirrostratus* resting on their tops in the S: much dew: the dripping shrubs steam in the sunshine, and the breath is visible: *Cirri* in bundles succeeded, at two different elevations, the lower pointing NW and SE, the higher NE and SW: heavy clouds next advanced from the S, the vane being at SE: a shower ensued by inosculation, about noon: drizzling, p. m. 28. Gray morning: a beautiful stratum of small *Cirrocumulus*, between *Cirrostratus* and *Cirrus*, at different considerable elevations: the *Cirrus* proved permanent, and the day was fine. 29. Very high coloured *Cirrocumulus* and *Cirrostratus* at sun-rise: fine. 30. Wet morning.

Tenth Mo. 4. Showers: evening, fine: windy. 5. Clear morning: showery day: wind high. 6. Foggy morning: clear day: a *Stratus* on the marshes at night. 7. Very foggy morning: white frost. 8. Foggy morning: fine, clear day. 9. Very foggy morning: cleared off about nine o'clock, a. m.: day fine. 10. Cloudy. 11. Cloudy, with slight showers: very boisterous night. 12. Morning calm and clear: day fine. 13. Fine day: a very distinct double lunar halo at night. 14. Fine day: clear moonlight. 17. Foggy morning. 21. Clear morning: very fine day.

RESULTS.

Prevailing Wind Southerly.

Barometer:	Greatest height	30·20 in.
	Least	29·19 in.
	Mean of the period	29·698 in.
Thermometer:	Greatest height	73°
	Least	31°
	Mean of the period	55·31°
Mean of the hygrometer		76°
	Rain	3·36 in.

⁂ The whole of the observations, except of the barometer, from the 1st to the 21st of the Tenth month, were made at the laboratory, Stratford.

Coloured Sky at sunrise before rain.

Travelling on the night of the 2d of Tenth month from London to Ipswich, I was struck with the peculiar beauty of the coloured sky, as we entered the latter town, at sunrise. The whole hemisphere was overspread with Cirrus, passing to Cirrostratus and Cirrocumulus, having an arched lowering appearance; the whole dipt in a great variety of tints. The most conspicuous show was however made by dense Cirrostrati to the SE and E, which assuming first a deep blood red passed next through crimson, and a gradation of lighter reds, to orange and then to flame colour. Though the morning was fine, the afternoon and night of the 3d proved very wet in these parts, as at Stratford.

Phenomena observed at Gosport, by Dr. William Burney.—*Thomson's Annals of Philosophy*, vol. xii. p. 368.

Sept. 1. A storm of rain, hail, thunder and lightning from two to half past four afternoon. 5. A fall of rain, amounting to 1·33 in., being as much as had fallen there in the preceding sixteen weeks. 16. A large *Lunar rainbow*, on an extensive Nimbus to the W; the harvest moon being in the E, nearly at full and about 10° above the horizon. 21—23. Strong gales from the S and SW, by day only. 23. From 40 till 55 minutes after five, p. m, a double rainbow to the E, when the sun was within two or three degrees of the W horizon. The interior bow appears to have measured 84° 30′ in diameter, and the exterior one being distant on each side 8° 22′ 30″, the total extent of the bow on the horizon from N to S, was 101° 15′. This measurement of the rainbow, the Doctor observes, is as wide as it can be, within nine minutes, according to the most accurate calculations: the bow was the finest in colours that he remembers to have seen.

25. Two coloured *parhelia*: each of them being at an equal altitude with the Sun, which, at eight, a. m. was 19° 4′ 40″, and distant 23° 30′ from that luminary; the conspicuous halo in which they were formed was consequently 47° in horizontal diameter: they were caused by an attenuated Cirrostratus cloud brought from the southward.

26. About eight minutes before eight, a. m. three coloured *parhelia* appeared in a coloured halo on a thin Cirrostratus that was passing very slowly in a NW direction. The two parallel with the Sun (at 18° above the horizon) were each 22° 35′; and the third, situate vertically, nearly 23° distant from the centre of his disc. The latter was formed by the intersection of a portion of another halo at the top of the perfect one, and was the largest and most resplendent in prismatic colours of the three. These parhelia were in both cases followed by rain in the afternoon: and the appearance of the Solar halo on the 1st, 6th, 14th, and 22d, and of Lunar halo in the evening of the 17th, were in like manner succeeded by rain, in some instances in less than four hours after.

Oct. 2. At eight, p. m. a very brilliant meteor fell through a space of about 25°; it was of the apparent size of Jupiter, towards which planet it descended from the zenith. 5. At one, a.m. several loud claps of thunder, with lightning, heavy rain, and strong gusts of wind. 7. A *Stratus*, with the first hoar-frost of the season, followed by a parhelion formed on a broad streak of Cirrostratus, a.m.: Cirri then appeared, succeeded by fleecy and dusky Cumuli, and lastly the Cumulostratus, which passed to Nimbus with a short shower.

8. At sun-set, fleecy and dusky Cumuli to the westward passed through orange, dark blue, lake and crimson tints, while the Eastern sky exhibited a rose colour, in an arch of about 35° in height, with a purple base: this magnificent appearance, the Doctor observes, was evidently produced by reflection from a dewy haze descending in that quarter.

9. A single *parhelion* on a Cirrostratus without solar halo, followed by a wet night.

In the valuable observations which I have here abridged, there will be found several points of comparison with my own. On the 1st of Ninth mo. *we* were sensible of a thunder-storm to the SE, preceding the one at Gosport in time by 12 hours—the distance between the two perhaps 100 miles, along the South coast. The 5th was distinguished with us also by heavy rain. On the 7th of Tenth mo. the first *hoar frost* appears to have been noticed, together with the *Stratus* cloud, both at Gosport and Stratford. The remark on the appearance of the Eastern sky during the fall of dew on the 8th, is a confirmation, with the addition of a measurement of the height of the phenomenon, of several notes which I have at different times made upon it. There is likewise a description, by the same observer, of two beautifully coloured parhelia in a preceding number of the Annals, vol. xii. p. 235, to which the reader is referred.

ICE IN THE ATLANTIC.

By Demerara papers of Oct. 24, it appears that Ice islands have been seen as far South as the West Indies; a very extensive one having been observed in the neighbourhood of the Bahamas.

TABLE CXLIX.

	1818.		Wind.	Pressure.		Temp.		Hygr.	Rain,
				Max.	Min.	Max.	Min.	at 9a.m.	&c.
10th Mo.	L. Q.	Oct. 22	SE	30·00	29·93	55	41	68	
		23	E	30 07	30·00	55	45	71	
		24	NE	30·07	30·02	55	44	70	13
		25	SE	30·05	30·01	60	46	73	
		26	SE	30·15	30·05	62	36	70	
		27	SE	30·16	30·14	60	37	72	
		28	SW	30·30	30·16	65	44	75	
	New M.	29	SW	30·35	30 30	60	41	79	
		30	SW	30·30	30 05	58	43	72	
		31	SW	30·05	29·89	57	46	81	20
11th Mo.		Nov. 1	NW	29·93	29·87	58	45	75	
		2	SW	29·87	29·70	60	51	77	2
		3	SW	29·70	29·45	61	42	74	
		4	SE	29·45	29·35	56	48	79	8
	1st Q.	5	NE	29·35	29·24	60	52	82	1
		6	E	29·60	29·26	58	50	77	
		7	SE	29·87	29·60	51	35	75	3
		8	E	29·94	29·87	52	42	78	
		9	NE	29·98	29·95	52	44	81	
		10	NE	29·95	29·72	50	45	79	86
		11	SE	29·80	29·65	53	41	99	3
	Full M.	12	SE	29·65	29·53	50	41	80	6
		13	SE	29·60	29·55	57	46	94	2
		14	S	29·55	29·32	56	43	77	52
		15	W	29·71	29·45	57	41	72	—
		16	SW	29·70	29·44	52	41	96	43
		17	NW	30·05	29·70	47	31	71	
		18	SW	30·07	30·05	47	34	90	
		19	SE	30·07	29·90	50	35	89	
		20	SE	29·90	29·70	45	36	76	
				30·35	29.24	65	31	78	2·39

Notes.—Tenth Mo. 23. Windy. 24. Cold wind: some rain, evening. 29, a. m. misty. (On the 26th, a little before eight in the evening, I observed from the neighbourhood of Lowestoft, Suffolk, a distinct commencement of *Aurora Borealis* in the north, in white streamers ascending to a considerable elevation, which after a minute or two became converted into a still light: the latter, remaining for an hour or two after, was at length obscured by clouds.)

Eleventh Mo. 1. Foggy morning. 6. Foggy evening. 7. Very fine, a. m. 10. Much wind, with heavy rain, in the night: about ten, p. m. the clouds were passing over rapidly from SE. 11. Small rain, a. m.: gloomy, p. m. 12. The moon at night rose gold coloured, and slightly veiled at intervals by the lighter modifications, with a mixture of haze: on these clouds were afterwards displayed a succession of halos, strongly coloured with green and red. I found by attentive observation that the halo in this instance, together with a corona, which appeared constantly within it, was not formed in the substance of the clouds above-mentioned, but in haze, which was probably situated near the earth; for the colours of the halo always survived (though faintly) the passing away of the white skreens of cloud by which at intervals they were set off and made conspicuous. 13. A fine day: large *Cumuli* beneath *Cirri*, the latter ranging at night from SE to NW very conspicuous: the moon again rose gold-coloured. 14. Rain, a. m., and again in the fore part of the night, with much wind from the southward. 15. Windy, cloudy, a. m.: lunar halo: rain in the night. 16. Wet morning: fair, p. m., with *Cirrus*, *Cirrostratus*, and *Cumulus*. 17—20. Fair: the sensible evaporation somewhat reinstated by a brisk wind at the close.

RESULTS.

Prevailing Winds Southerly and Easterly.

Barometer:	Greatest height	30·35 in.
	Least	29·24 in.
	Mean of the period	29·834 in.
Thermometer:	Greatest height	65°
	Least	31°
	Mean of the period	48·75
Mean of the hygrometer		78°
	Evaporation	1·31 in.
	Rain	2·39 in.

The observations on the thermometer and rain for the former half of the period, and on the hygrometer for the whole, were made at the laboratory.

Observations made at Lowestoft.

I spent nearly the whole of the Tenth month with my family on this, the most easterly point of our island. After a heavy rain at the time of our arrival we had a variety of fine autumnal weather: clear calm days with dew and gossamer—Cumuli, &c. with a brisk air—gray autumnal skies—and once, for three days, a gale at NE, with a uniform close canopy of Cumulostratus.

On this occasion I remarked that, at a temperature of 47°, in the middle of the day, the air which blew directly from the sea, and carried with it an abundance of spray in a fine mist from the surf, was yet so dry, just out of this mist, that De Luc's hygrometer stood at 54 degrees, and evaporation proceeded rapidly. But at other times a *southerly* wind, coming along shore, was as moist as usual, giving 87° by the hygrometer. The mere *contact of the sea* in crossing from land to land does not therefore render the lower air so moist as we might suppose.

TABLE CL.

	1818.		Wind.	Pressure.		Temp.		Hygr.	Rain,
				Max.	Min.	Max.	Min.	at 9 a.m.	&c.
11th Mo.	L. Q.	Nov. 21	SE	29·70	29·67	40°	37°	64	
		22	E	29·72	29·47	50	34	65	—
		23	S	29·70	29·47	54	43	92	27
		24	S	30·05	29·70	46	30	100	9
		25	S	30·14	30·05	50	32	82	10
		26	SW	30·32	30·10	54	48	93	13
		27	SW	30·40	30·32	54	48	88	
	New M.	28	SW	30·38	30·30	57	48	76	
		29		30·30	30·20	58	46	75	
		30	S	30·20	30·03	57	46	75	
12th Mo.		Dec. 1	SW	30·03	29·88	46	42	64	20
		2	N	30·00	29·60	48	36	71	—
		3	SW	29·60	29·45	49	35	100	
	1st Q.	4	SW	29·42	29·37	47	40	76	
		5	SE	29·57	29·42	51	33	74	
		6	SE	29·58	29·27	51	40	77	
		7	SW	29·65	29·27	54	44	81	30
		8	SE	30·00	29·65	54	36	88	10
		9	NE	30.10	30.00	46	32	76	40
		10	NE	30·13	30·08	45	32	88	
		11	NE	30·14	30·08	43	30	71	
	Full M.	12	NW	30·12	30·07	42	37	80	2
		13	NE	30·18	30·10	41	31	69	
		14	NE	30·20	30·15	43	33	87	
		15	NE	30·15	29·96	40	23	78	
		16	NW	30·17	30·00	32	16	78	
		17	NW	30·12	29·82	28	18	79	
		18	Var.	30·00	29·70	39	25	84	13
		19	SW	30·25	30·00	43	29	86	
	L. Q.	20	SW	30·10	29·90	47	43	73	1
				30·40	29·27	58	16	79	1·75

NOTES.—Eleventh Mo. 21. Fair: cloudy, with a strong breeze. 22. *Cirri* tending to *Nimbus*, a. m.: *Cumulus* beneath *Cirrostratus*: little wind. 23. Wet, gloomy, a. m. fair, p. m.: at sun-set, rose-coloured *Cirri*, with orange in the twilight. 24. Foggy morning: the dew frozen on the grass: the vane at SW. 25. A very dense *Cirrostratus*, a. m. forming a mist, which did not reach to the tops of the trees: a solar halo at 11: more clear in the evening: rain in the night: the wind SW to SE. 26. Wet, windy morning: fair and cloudy, p. m. and night. 27, 28. Cloudy, 29. Gloomy, fair, calm. 30. A breeze, with light clouds: fine, p. m. with *Cumuli*.

Twelfth Mo. 1. Rain in the night. 2. The vane at N, a. m. but in the night the wind came to SW, blowing fresh, with a little rain. 3. Vane at S in the morning, with much wind: cloudy. 4. Fair, windy, cloudy. 7. A drizzling rain through the day. 6. Hoar frost, 8. Showery, a.m. 9. Wet. 10—20. Chiefly fair and cloudy: at intervals, fine, with the wind moderate: very white hoar frost on some of the latter mornings, with rime to the tops of the trees. Large lunar coronæ were frequent in the evenings, and lunar halo occurred more than once; but the dates were not noted.

RESULTS.

Winds Variable.

Barometer:	Greatest height	30·40 in.
	Least	29·27 in.
	Mean of the period	29·925 in.
Thermometer:	Greatest height	58°
	Least	16°
	Mean of the period	41·20°
Mean of the hygrometer		79°
	Evaporation	0·35 in.
	Rain	·1·75 in.

The few nocturnal frosts that occurred in the present season, up to the middle of the 12th month, were so slight as to permit the *Nasturtiums* (the tenderest of our autumnal garden flowers) to continue to vegetate: other indications of the mildness of the season were equally striking. I observed a horse-chesnut with tufts of new leaves and blossoms put forth from the ends of the branches all over the tree; but the severe nights, and some frost by day, since the 15th, have put a seasonable stop to vegetation. The temperature of the latter half of the period, and the hygrometer throughout, were noted at the laboratory.

STATE OF VEGETATION.

The extraordinary growth of mushrooms, this autumn, makes a kind of second harvest for the industrious poor in most parts of the island, some of whom have gathered from three to five pecks daily.

John Foster, Esq. of Newton, near Carlisle, has a single tree in his orchard which has, this year, produced *ten thousand* apples.—*Pub Ledger, Sept.* 28.

An apple-tree in the garden of D. Sutton, Esq. at Kensington, opposite Holland House, is now covered with a second full crop of apples; and there are several others in the same garden which have also had a second produce this year, though not in such abundance.—*Pub. Ledger, Nov.* 12.

STOCKHOLM, *Nov.* 17.—The uncommonly serene and mild autumnal weather still continues, and now supplies us in abundance with garden produce, of which we were deprived during the summer by the great drought. To be without fire in the stoves, and to have the meadows covered with verdure instead of snow, is a strange phenomenon here in the month of November.

A thorn-tree growing in the lawn at Shugborough, the seat of Lord Anson, is now in full blossom, and the whole tree presents a May-like appearance.—*Dec.* 1.

There was lately in the garden of G. Dickson, Esq. of Cousland, Berwickshire, (formerly the garden of the old Priory of Cousland,) a tulip-tree in full blossom, which is but the second time it was ever known to be in that state. The last time this tree was in blossom was in the year 1720, being 98 years ago.—*Dec.* 2.

Among the many instances of the extraordinary temperature of the present season, may be mentioned that from the Garden of Thomas Newton, Esq. of Clapham Common, green peas of full growth and flavour were gathered a day or two ago, and the haulm still remains in full blossom —*Pub. Ledger, Dec.* 18.

	1819.	Wind.	Pressure.		Temp.		Hygr.	Rain,
			Max.	Min.	Max.	Min.	at 9 a.m.	&c.
12th Mo.	Dec. 21	W	30·50	30·15	48°	24°	76	—
	22	Var.	30·50	30·40	28	23	93	
	23	NW	30·40	30·27	35	23	96	
	24	Var.	30·27	30·10	28	22	87	
	25	NE	30·10	29·82	38	26	88	
	26	SE	30·05	29·80	35	30	72	
	New M. 27	SE	30·47	30·05	39	32	78	
	28	NE	30·60	30·47	41	30	69	
	29	NW	30·58	30·47	38	22	81	
	30	W	30·45	30·38	34	23	84	
	31	NW	30·48	30·38	38	26	94	
1st Mo.	1819, Jan. 1	NW	30·50	30·45	35	26	90	
	2	W	30·45	30·30	38	30	90	
	1st Q. 3	SE	30·30	30·15	42	24	75	
	4	SE	30·17	30·11	40	22	95	
	5	N	30·18	30·15	40	26	97	
	6	Var.	30·15	29·76	45	32	95	
	7	S	29·86	29·60	46	33	80	—
	8	W	29·86	29·40	47	33	81	25
	9	SW	29·87	29·43	51	34	72	36
	10	SW	29·80	29·48	49	40	75	15
	Full M. 11	SW	29·60	29·48	46	34	98	11
	12	SW	30·13	29·60	50	33	82	
	13	SW	30·12	29·95	49	35	75	—
	14	SW	30·00	29·85	53	37	88	—
	15	SW	30·20	29·77	50	33	79	16
	16	NW	30·30	30·00	50	34	61	—
	17	SW	30·00	29·25	50	35	70	19
	18	NW	29·80	29·28	43	32	71	
			30·60	29·25	53	22	82	1.22

NOTES.—Twelfth Mo. 21. Much wind about three, a. m. with a little rain: a very fine day ensued: *Cirrocumulus*, with bright sunshine. 22. White frost: foggy, a. m.: clearer, p. m. with *Cirrus*: rime on the trees. 23. White frost: rime to the tree tops: misty, a. m.: sun very bright at noon: much fog to the south. 24. Very foggy: rime still on the trees. 30. White frost. 31. A very fine day.

1819.—First Mo. 1. Very foggy, with the addition of obscurity from smoke. 3. Fair: rather overcast sky. 4. Much rime on the trees: rather misty air. 5. Somewhat misty: the melted rime forming puddles under the trees. 6. Fine day: at night, small portions of cloud were observed to pass swiftly under the moon. 7. The sun-rise was attended with a veil of *Cirrus* clouds passing to *Cirrostratus*, very red and lowering: about noon *Cumuli* and other clouds, with a gale and showers. 8. Fine day: night windy, with some rain. 9. Hazy, a.m. with *Cirrostratus* and wind: heavy showers, p.m.: very clear night. 10. Overcast soon after sun-rise, with wind: the fore part of the night very stormy. 11. A wet squall this morning: fair day, with *Cirrus* and wind. 12. Fair morning, with slight hoar frost: the gale has subsided. 13. Slight hoar frost: very fine day: at evening, windy again. 14, 15. Windy, with some showers. 16. A fine drying wind, a.m. with *Cirrus* and *Cirrostratus* in delicate striæ: also transient *Cirrocumulus* at a great elevation: a stormy night followed. 17. A very tempestuous day: the rain ceasing for a while, a.m. I observed *Cirrostratus* around large *Cumuli*, rising and separating, as if the shower had been produced by their previous inosculation: much wind in the night. 18. A fine, drying day, with the wind more moderate, and an overcast sky.

RESULTS.

Winds Variable and gentle, with fogs in the fore part; in the latter, strong South-west gales, with rain.

Barometer:	Greatest height	30·60 in.
	Least	29·25 in.
	Mean of the period	30·068 in.
Thermometer:	Greatest height	53°
	Least	22°
	Mean of the period	35·86°
Mean of the hygrometer		82°
	Rain	1·22 in.
	Evaporation, about	0·50 in.

Extract of a Letter from Petersburgh.

Petersburgh, First Month 5, 1819.—The weather here is most extraordinary for this climate. It is now a thaw; a circumstance not remembered here at this date by any person living. Great quantities of the frozen meat brought from the interior are spoiling.—W. A.

Barcelona, Jan. 2.—For these ten days past we have experienced strong gales from the Eastward.

Dumfries, Jan. 15.—It has blown a very heavy gale from SW to W for six days past, but is now more moderate.

Port Glasgow, Jan. 17.—The weather still continues very tempestuous.

Penzance, Jan. 17.—A gale from W to WNW the whole day and night.

Portsmouth, Jan. 18.—No arrival or sailing. The whole of the day it has blown very strong from WNW.

Ostend, *Jan.* 16.—It blew nearly a hurricane during the night, from NW to N. —*Shipping List.*

	1819.		Wind.	Pressure.		Temp.		Hygr.	Rain,
				Max.	Min.	Max.	Min.	at 9a.m.	&c.
1st Mo.	L. Q.	Jan. 19	NW	29 80	29·45	44	33	66	19
		20	W	29·57	29·28	41	33	70	9
		21	W	29·52	29·20	40	32	66	
		22	SW	29·72	29·20	49	34	89	—
		23	SW	29 72	29·60	45	33	75	
		24	SE	29 60	29·20	47	36	90	
		25	SE	29·43	29·10	47	39	74	26
	New M.	26	SE	29·45	29·35	47	35	83	
		27	E	29·44	29·35	49	38	96	
		28	SE	29·52	29·30	50	31	85	
		29	E	29·52	29·35	50	30	97	
		30	E	29·40	29·28	42	33	88	43
		31	NW	29·62	29·40	42	25	78	—
2d Mo.		Feb. 1	SW	29·60	29·49	38	28	85	—
	1st Qr.	2	NW	29·73	29·49	38	18	90	—
		3	SE	29·73	29·42	41	25	88	—
		4	NW	29·80	29·47	43	31	75	29
		5	E	29·78	29·46	47	35	95	12
		6	W	29 61	29·39	50	36	85	17
		7	NW	29·65	29·35	47	33	68	
		8	W	30·00	29·65	46	34	72	
		9	SW	29 95	29·63	51	44	85	37
	Full M.	10	NW	30·05	29 58	49	36	69	
		11	W	30 03	29·79	51	34	72	
		12	W	29 79	29·50	48	33	69	—
		13	NW	29·90	29·62	47	27	64	14
		14	NW	30·12	29·90	47	25	64	
		15	SW	30·08	29·70	47	34	65	
		16	S	29·70	29·37	51	42	69	10
				30·12	29·10	51	18	78	2·16

Notes.—First Month. 19. *Cirrus* with *Cirrocumulus*, in lines stretching N and S: rain in the night. 20. A very fine day: *Cirri*, p.m. rain and wind in the night. 21. Slight hoar-frost: *Cirrocumulus*. 22. Fair day: rain and wind, evening. 23. Very fine. 24. Fair: strong breeze: cloudy. 25. Rain, a.m. 26. Fair day: large *Cumuli* appeared, passing to *Cumulostratus* with plumose *Cirri* above: at evening there were indications of the *Stratus*. The *Nimbus* has been frequent during the past week: the wind generally moderate in the day, and strong the fore part of the night. 29. Morning rather overcast: day fine, with the lighter modifications ranging (as frequently or late) in lines N and S. About ten, a.m. in going to London, I observed a solar halo of large diameter, imperfect in its superior and inferior part, except a trace at the vertex, but exhibiting, in the points directly N and S of the sun, *two parhelia*, which continued with a faint variable brightness for about twenty minutes. 30. Wet morning: drizzling most part of the day: wind SE, and then NE. 31. Overcast: rained a little, a. m.

Second Mo. 1. Hoar frost, with *Cirri* in the sky, pointing upwards from a base: drizzling rain at night. 2. *Snow* (for the first time this season) continuing most part of the forenoon from sun-rise: then, brilliant sunshine, and frost at night, with the Thermometer nearly as low as the minimum of the present winter. 3. Rather misty and overcast, a. m.: wet evening. 4. Cloudy: fair, a. m.: showers, p. m. 5. Misty, drizzling. 6. Very fine, with *Cumuli*, &c. a. m. in the afternoon, a squall of wind, with a few drops: in the night a gale followed by rain. 7. Very fine. 8. Fair, with *Cirrostratus* in parallel bars here and there, under uniform haze: at night a lunar halo, very large and colourless. 9. Wet day: stormy night. 10. Early this morning it was very tempestuous; but the day was fine, with *Cumuli* carried by a moderate gale, and *Cirri* scattered like loose hay above: at night, with *Cirrostratus*, a succession of small, ill-formed, but highly coloured halos. 11. Fine, with *Cumulus*, *Cirrostratus*, and wind. 12. Fine morning, then showers (in London attended with hail), and much wind at night. 13. Fine morning: *Cumulus* capped with *Cirrostratus*: *Nimbi*, p. m. with a transient rainbow. 14. Slight hoar frost: fine, with *Cumulostratus*, and a breeze. 15. Fine: the ground was frozen this morning, and *Cirrocumulus* at the same time above. 16. Overcast morning: wet and windy, p. m. and night.

RESULTS.

Winds Westerly, except a week about the New Moon, when they were East and South-East.

Barometer:	Greatest height	30·12 in.
	Least	29·10 in.
	Mean of the period	29·522 in.
Thermometer:	Greatest height	51°
	Least	18°
	Mean of the period	39·31°
Mean of the Hygrometer		78°
	Evaporation	0·65 in.
	Rain	2·16 in.

Falmouth, *Jan.* 24.—A strong gale all last night from the SW, with heavy squalls of hail and rain. 25. A heavy gale the whole day from SW to WSW.

Hull, *Jan.* 25.—A heavy gale from SE. 26. More moderate, from WSW.

Portsmouth, *Jan.* 25.—A very heavy gale the whole day, with tremendous gusts from the Southward and SSW.

Deal, *Jan.* 25.—Two, p. m. Wind S, blows hard and a tremendous sea.

ST. UBES, *Jan.* 28.—The weather changed between the 23d and 24th at night, and ever since has continued extremely stormy, with rain and hail, thunder and lightning. A severe shock of an earthquake was felt, and afterwards another not so violent.—*Shipping List*.

Milford, *Feb.* 15.—All the vessels bound round land sailed yesterday with the wind at NNW: the wind shifted during the night to the Southward and they are put back. 16. It blows hard from the SSW.

TABLE CLIII.

	1819.		Wind.	Pressure.		Temp.		Hygr. at 9a.m.	Rain, &c.
				Max.	Min.	Max.	Min.		
2d Mo.	L. Q.	Feb. 17	SW	29·54	29·35	52°	39°	64	30
		18	NW	29·62	29·30	49	42	90	9
		19	SW	29·85	29·15	51	31	80	—
		20	SW	29·85	28·90	52	36	69	23
		21	N	29·90	28·90	49	38	65	13
		22	Var.	29·97	29·33	45	34	67	35
		23	SE	29·53	29·33	45	28	76	27
	New M.	24	NW	29·75	29·40	45	23	67	8
		25	NW	29·80	29·52	41	27	75	
		26	SW	29·52	29·31	39	30	68	6
		27	Var.	29·31	29·25	45	37	89	7
		28	SE	29·26	29·14	40	34	78	—
3d Mo.		March 1	NE	29·30	29·17	41	34	87	54
		2	E	29·61	29·30	44	35	94	11
	1st Q.	3	NE	29·90	29·61	39	34	65	
		4	NE	29·98	29·87	45	34	62	7
		5	NE	29·97	29·83	47	40	83	
		6	NE	30·10	29·90	50	36	85	
		7	NE	30·16	30·10	46	37	66	
		8	NE	30·12	30·08	46	30	81	
		9	SE	30·13	30·10	47	27	67	
		10	NW	30·10	30·04	46	34	82	
	Full M.	11	NW	30·10	30·07	51	42	74	
		12	NW	30·31	30·16	51	41	65	
		13	NW	30·34	30·29	48	40	61	
		14	Var.	30·30	30·14	48	24	59	
		15	NE	30·14	29·99	57	34	67	—
		16	W	30·13	29·98	59	40	85	—
		17	NW	30·25	30·13	46	27	60	—
		18	NW	30·15	29·45	49	35	63	
				30·34	28·90	59	23	73	2·30

Notes.—Second Mo. 17. A fair day, with *Cumulostratus:* rain by night. 18. Fine and spring-like: *Cumuli* capped with *Cirrostratus*, a. m.: very stormy night. 19. After a squall in the morning, a very fine day, with large *Cumuli* and *Nimbi:* a full bright rainbow at three, p. m.: the wind settled by evening. 20. Hoar frost: very fine morning, p. m.: large ramified *Cirrus* mixed with *Cirrocumulus* at a great height: *Nimbi:* some violent wet squalls in the night from the southward. 21. Large *Cumuli*, and much wind: showers. 22. Wind shifted to N: cloudy morning: *Cumulostrati* by inosculation. 23. Wind and rain: of the latter, 0·35 in. between six and nine, and 0·27 in. more by noon: afternoon, a gale, with much cloud: evening more settled. 24. Fine morning: at noon, lofty large *Cumulostrati*, with bright sun: in the course of the afternoon, an obscurity, like the crown of the *Nimbus*, came down upon these clouds; and a considerable fall of *snow* took place before dark, with wind. 25. Snowy morning: the hills white with snow; which soon vanished before a bright sun, p. m. 26. *Cirrocumulus* appeared above, while the ground and water were frozen: about half-past ten, a faint, but large *solar halo*, which continued till near eleven, when obscurity came on from the southward, followed by drizzling rain, p. m. 27. Overcast morning: rain in the night. 28. Cloudy: some rain.

Third Mo. 1. Snow and sleet, a. m.: a wet day. 2. Wet morning: cloudy, drizzling day. 3. A moderate easterly gale, with much cloud: a gleam of sunshine, p. m.———18. There has been scarcely any rain since the 4th; the sky mostly gray, with light clouds; at times, overcast, or filled with *Cumulostratus*: the wind northerly, breezes, and the air drying; so that the roads at the close of the period, notwithstanding some very light showers of late, remained considerably covered with dust. The diverging bars of light and shadow, produced by the sun's rays passing through the interstices of clouds, have been several times exhibited within these two days.

RESULTS.

Winds for the most part Northerly.

Barometer:	Greatest height	30·34 in.
	Least	28·90 in.
	Mean of the period	29·768 in.
Thermometer:	Greatest height	59°
	Least	23°
	Mean of the period	40·78°
Mean of the hygrometer		73°
	Evaporation	0·66 in.
	Rain	2·30 in.

Weymouth, Feb. 21. It blew very hard last night from the SW.

Falmouth, Feb. 21. It has blown a heavy gale all day, WNW.

Torbay, Feb. 22. All the vessels sailed this morning with the wind at N, after having experienced a tremendous gale at W, all yesterday.

Deal, Feb. 23. It has blown very strong the whole morning from SSW: at three p. m. suddenly shifted to due N: five, p. m. blows very strong.

Falmouth, Feb. 23. It has blown very heavily all day from the N & NW. 24. It has blown very heavily all day and continues unabated, from the N.

March 3. The wind has been very high all day, and is much increased since dark, from the Eastward.—*Shipping List.*

TABLE CLIV.

	1819.		Wind.	Pressure.		Temp.		Hygr.	Rain,
				Max.	Min.	Max.	Min.	at9a.m.	&c.
3d Mo.	L. Q.	Mar. 19	Var.	29·50	29·21	51°	38°	90	16
		20	NW	29·75	29·50	46	37	65	—
		21	NW	29·80	29·75	48	32	59	
		22	NW	29·80	29·70	53	35	63	
		23	S	29·70	29·49	51	42	61	—
		24	SW	29·62	29·49	58	44	77	—
	New M.	25	SW	29·85	29·64	55	37	67	—
		26	W	29·90	29·85	54	40	68	—
		27	SW	29·90	29·73	55	46	59	59
		28	SW	29·77	29·68	54	46	85	—
		29	SW	29·96	29·67	57	43	67	
		30	SW	30·07	29·96	58	50	69	8
		31	SW	30·18	30·07	59	47	69	
4th Mo.		April 1	W	30·20	30·15	62	48	61	
	1st Q.	2	W	30·15	30·05	68	36	66	
		3	N	30·17	29·99	68	43	67	
		4	E	30·17	30·07	60	38	61	
		5	NE	30·06	29·94	60	29	61	
		6	SE	29·94	29·60	54	43	60	
		7	E	29·80	29·62	66	46	60	10
		8	NW	30·00	29·80	58	40	74	33
		9	N	30·07	29·95	61	34	67	
	Full M.	10	W	29·95	29·35	64	40	66	
		11	SW	29·35	29·27	60	37	66	14
		12	NE	29·30	29·12	50	43	74	35
		13	Var.	29·48	29·12	58	40	85	3
		14	SW	29·48	29·30	60	42	74	—
		15	SW	29·40	29·03	60	45	76	—
		16	S	29·40	29·03	58	44	68	45
				30.20	29·03	68	29	68	2·23

Notes.—Third Mo. 19. A moderate gale at SW in the early morning, with much cloud carried by the wind. About ten, the wind changing suddenly to NW, the whole mass of cloud to the southward became an immense *Nimbus*, the base reaching from the SW to the NE, with a lighter sky visible beyond: at the same time precipitation was going on overhead, and we had soon a smart shower mingled with hail: the whole ended in a uniform veil of *Cirrostratus*, and at night we had the SW wind again pretty strong. 20. The wind changed again to NW, a.m. with much cloud, and some drops of rain. 21. Fine day: a smart breeze from NW. 22. Fine day. 23. A trifling shower. 24. Wet, windy morning: fair day. 25. A shower with hail at mid-day: a large *Nimbus* passed, and a distant peal of thunder was heard to the NW. 26. Chiefly *Cumulostratus:* a very little rain, p. m. 27. Windy, with much cloud, and two or three showers. 28. Cloudy: a gale through the day. 29. Cloudy. 30. A rainbow at nine, a. m.: squally, with showers: the bow again twice about three, p. m. 31. Cloudy: some drops of rain.

Fourth Mo. 2. A lunar halo at night, of large diameter, and colourless: it was sensibly elliptical, the longer diameter being the perpendicular; it continued two or three hours. 3. Large *Cirri*, with *Cumuli:* much dew: very fine day. 4. *Cumulostratus.* 5. Fine morning: the hoar frost remained at seven, a. m. on some tufts of *Saxifraga cæspitosa*, &c. (as heretofore noticed) long after it had disappeared elsewhere in my garden; proving that the warmth which melted the ice came in this instance chiefly from the earth, and was here intercepted by a bad conductor. 6. Large plumose *Cirri*, with *Cirrostratus*, a. m. 7. The maximum of temperature for the past 24 hours occurred at nine this morning: thunder-clouds ensued, which soon passed to a quiescent mixture of different modifications, and rain came on at evening. 8. Much *Cirrostratus*, with pretty heavy rain, p. m.: at evening the wind changed to NW, with a rainbow and a turbid mixture of different clouds. 9. Fine, with *Cumulostratus:* wind N, p. m. 11. The clouds this evening were tinged with a strong lake colour, on the bases of *Cumulostrati*, beneath *Cirrus:* some rain attended. 12. Wet, most of the day. 13. Rain, a. m. 14. *Cumulostratus:* in the evening streaks of *Cirrus* from SW to NE, followed by wind and rain. 15. Clouds followed by rain in the night, as before. 16. After a fine day with clouds, rain in the early morning.

RESULTS.

Winds chiefly Westerly.

Barometer:	Greatest height	30·20 in.
	Least	29·03 in.
	Mean of the period	29·738 in.
Thermometer:	Greatest height	68°
	Least	29°
	Mean of the period	49·20°
Mean of the hygrometer		68°
Rain		2·23 in.
Evaporation		1·32 in.

TABLE CLV.

	1819.		Wind.	Pressure.		Temp.		Hygr.	Rain,
				Max.	Min.	Max.	Min.	at 9 a.m.	&c.
4th Mo.	L. Qr. April	17	S	29·57	29·40	55	43	75	15
		18	SW	29 76	29·57	58	36	62	4
		19	W	29·76	29·72	57	47	64	44
		20	SW	29·72	29·59	61	46	82	—
		21	SW	29·79	29·59	59	42	72	—
		22	NW	29·85	29 74	49	42	76	
		23	E	29·74	29·51	51	46	90	15
	New M.	24	E	29·65	29·51	52	45	100	25
		25	NE	30·08	29·65	50	34	76	2
		26	E	30·16	30·08	52	32	68	
		27	E	30·16	—	56	25	62	
		28	SE	—	30·05	60	31	60	
		29	E	30·05	29·80	59	28	60	
		30	SE	29·80	29·75	60	28	60	
5th Mo.	May	1	SW	29·75	29·68	66	33	57	
	1st Q.	2	SE	29·68	29·57	69	48	52	
		3	SE	29·57	29·45	71	49	58	—
		4	SE	29·50	29·45	69	50	87	68
		5	SE	29·88	29·50	65	44	69	
		6	SW	30·00	29·88	64	39	62	
		7	SE	30·00	29·98	66	49	67	
		8	E	30·17	29·98	69	44	63	
	Full M.	9	SE	30·14	30·06	73	46	59	18
		10	NW	30·14	30·10	69	53	65	
		11	W	30·10	30·04	65	54	67	
		12	NW	30·10	30·04	67	53	61	
		13	NW	30·10	30 00	64	41	60	
		14	NW	30·04	30·02	64	40	58	
		15	N	—	—	67	42	59	
				30·17	29·40	73	25	67	1·91

Notes.—Fourth Mo. 17. Much wind in gusts, a. m.: the clouds large, and carried at a great elevation: the first swallows appeared: wet squalls, p. m.: some lightning about ten, and a gale through the night. 18. *Cumulus*, with the lighter modifications above, followed by *Nimbi* and wind: hail in a shower about three, p. m.: the rainbow twice: calm at evening. 19—22. Mostly cloudy, with *Cumulostratus*: the cuckoo was heard in this interval. 23. Gloomy sky, with much *Cirrostratus* at evening: rain in the night. 24. Drizzling, a. m.: wet and windy, p. m. 25. A gale, with much cloud in the morning: fair,

p. m. 26. Fair, with heavy *Cumulostratus*. 27, 28. Hoar frost: clear, fine days, with *Cumulus*, *Cumulostratus*, and *Cirrus*. The dark part of the moon's disk, which has been scarcely discernible this winter, is again plainly visible in the evening, as she follows the sun. 29. Hoar frost: fine day, with *Cirrus* and breezes.

Fifth Mo. 1. Fine: much *Cirrocumulus*, mixed with *Cirrus*: the wind a breeze. The gardens have suffered a little by the late frosts, more especially the gooseberry bushes, which have cast a part of their crop. 2. A superior westerly current appeared, a. m. carrying flocks of *Cirrocumulus*: between this and the SE wind below were large plumose *Cirri*, on one of which appeared a trace of a solar halo. These clouds increasing, with haze and *Cumuli* intermixed, the character of the sky became electrical: there was a lunar corona and a small bright halo at night, with some lightning to the SW. 3. Clouds grouped with an electric appearance as yesterday. 4. Obscurity and a little rain, a. m.: heavy showers, p. m.: rain in the night. 5. Fine, with *Cumulostratus*. 6. The same: *Cirrus* and *Cumulus* appeared: the smoke was attracted by the clouds, and a few drops of rain fell by inosculation among the latter, p. m. 7, 8. Clouds various, and mixed with haze: on the latter night, a very luminous large corona round the moon. 9. Large plumose *Cirri*, followed by obscurity and *Cirrocumulus*, with an electrical character: a fine shower at evening: rain in the night. 10—15. Fair, with the lighter modifications, and breezes.

RESULTS.

Winds Easterly in the middle, Westerly in the beginning and end of the period.

Barometer:	Greatest height	30·17 in.
	Least	29·40 in.
	Mean of the period	29·83 in.
Thermometer:	Greatest height	73°
	Least	25°
	Mean of the period	51·67°
Mean of the hygrometer		67°
	Evaporation	2 in.
	Rain	1·91 in.

METEOR.

A very remarkable Meteor was seen at Aberdeen, May 5th. At about *half-past twelve in the day*, it appeared at an altitude of nearly 36°, having the form of a ball of fire with a short tail, darting towards the earth. The atmosphere was uncommonly clear, with bright sunshine and no clouds. In about five minutes it exploded with a considerable noise, leaving a small white cloud of smoke. It was seen in many parts of the country. *Journal of the Royal Inst.* From a Scotch Paper.

TABLE CLVI.

	1819.	Wind.	Pressure.		Temp.		Hygr.	Rain,
			Max.	Min.	Max.	Min.	at 9 a.m.	&c.
5th Mo.	L. Q. May 16	SE	30·08	30·02	72°	37°	59	
	17	NE	30·02	29·86	75	40	59	
	18	SW	29·86	29·70	69	50	60	48
	19	NE	29·70	29·63	65	54	86	24
	20	SW	29·63	29·59	63	51	71	40
	21	SE	29·66	29·49	62	42	76	4
	22	SE	29·90	29·66	70	39	70	
	23	E	29·91	29·90	77	50	65	27
	New M. 24	E	29·94	29·91	63	49	72	4
	25	NE	29·91	29·90	65	47	72	
	26	NE	29·92	29·91	60	40	70	
	27	NE	29·91	29·87	63	42	63	
	28	NE	29·93	29·89	60	33	60	—
	29	NE	30·02	29·93	60	31	60	
	30	NW	30·09	30·02	64	44	55	9
	31	SW	30·13	30·09	64	46	62	5
6th Mo.	1st Q. June 1	SW	30.10	30·09	70	53	64	
	2	SW	30·10	30·06	70	47	67	
	3	SW	30·06	30·00	72	56	61	
	4	SW	30·06	29·95	72	45	71	9
	5	SW	30·10	30.07	72	45	63	
	6	SW	30·07	29·70	75	53	59	1
	7	SW	29·72	29·68	66	47	65	
	Full M. 8	SE	29·66	29·63	70	46	62	1
	9	S	29·72	29·67	75	51	62	
	10	SW	29·97	29·72	72	46	59	25
	11	W	30·04	29·97	70	47	63	
	12	SW	30·09	30·04	70	37	60	2
	13	SE	30·10	30·04	70	48	59	
	L. Q. 14	SW	30·04	29·85	71	49	61	3
			30·13	29·49	77	31	64	2·02

NOTES.—Fifth Mo. 16, 17. Fine. 18—21. Rainy: hail in the showers on the latter day: *Cumulus, Nimbus, Cirrus.* 22. *Cirrostratus:* lightning at night to the north-west. 23. Fine day: rain in the night. 24, 26. Cloudy. 28, 29. Frosty mornings. The potatoes suffered considerably in their growing tops, the temperature having undoubtedly been lower on the ground than at the height of the thermometer. 30. Showers.

Sixth Mo. 1. Cloudy. 2, 3. Fine. 4. Showery. 10. *Nimbi*, very large and distinct: a thunder shower about three, p.m. and a brilliant rainbow in the evening. 11. Fine. 12. Showers. 13. Fine, 14. Cloudy.

RESULTS.

Winds Easterly in the fore part, Westerly in the latter part of the period.

Barometer:	Greatest height	30·13 in.
	Least	29·49 in.
	Mean of the period	29·899 in.
Thermometer:	Greatest height	77°
	Least	31°
	Mean of the period	56·90°
Mean of the hygrometer		64°
	Rain at Stratford	2·02 in.
	Rain at Tottenham	2·29 in.

The above observations, two or three incidental articles excepted, are extracted from the register kept at the Laboratory.

A letter from *Palermo*, of the 4th of March, states that during the preceding fourteen days, the weather had been dreadful, and that three shocks of earthquake had occurred. Much mischief was done by the shocks in the southern part of the island (of Sicily), churches being thrown down and villages destroyed.—*Journal of the R. Institution.*

TABLE CLVII.

	1819.	Wind.	Pressure.		Temp.		Hygr.	Rain,
			Max.	Min.	Max.	Min.	at 9a.m.	&c.
6th Mo.	June 15	SW	29·97	29·83	63	42	65	33
	16	NW	30·12	29·97	62	45	61	2
	17	NW	30·13	30·07	72	52	63	1
	18	NW	30·14	30·05	67	52	82	45
	19	NW	30·19	30·14	72	47	66	
	20	NW	30·19	30·18	72	45	61	
	21	NW	30·18	30·09	78	49	59	
	New M. 22	NW	30·09	30·08	68	55	59	
	23	NW	30·08	29·94	72	52	59	
	24	SW	29·94	29·81	63	56	66	5
	25	SW	29·93	29·72	66	55	75	—
	26	S	29·74	29·69	67	48	69	—
	27	Var.	29·74	29·73	65	50	70	30
	28	NW	29·86	29·73	60	45	64	23
	29	NW	29·86	29·79	70	54	63	
	1st Q. 30	W	29·86	29·77	72	46	67	..
			30·19	29·69	78	42	65	1.39

Notes.—Sixth Mo. 15. Rain. 16, 17. Cloudy. 18. Wet, a. m. 19—23. Fine days. 24. Morning, overcast: drizzling rain. 25, 26. Cloudy. 27. Frequent heavy showers: at sun-set, strong shadows projected from behind a *Cumulus* or two, amidst a wild-looking sky: the clouds opposite the setting sun tinged to a very fine yellow. 28. Cloudy morning: a confused sky, exhibiting a mixture of *Cirrus*, *Cirrocumulus*, *Cumulus*, &c.: about eleven, a. m. some hail ushered in a thunder shower: the lightning was vivid at Stratford, and the thermometer fell 8° during the shower. Other thunder showers succeeded, till one, p. m. when there was a very heavy storm of large hailstones, which nearly covered the ground. This was attended with vivid lightning to the southward, and thunder at a small distance. 29. Overcast. 30. Fine.

RESULTS (of the half period).

Winds Westerly, and chiefly North-west.

Barometer:	Greatest height	30·19 in.
	Least	29·69 in.
	Mean height	29·955 in.
Thermometer:	Greatest height	78°
	Least	42°
	Mean height	58·17°
	Rain at Stratford	1·39 in.
	Rain at Tottenham	1·63 in.
	Mean of the hygrometer	65°

The present Table, which contains only the half of the usual Lunar period, brings up the observations to the close of the Sixth month, 1819. Having continued the publication of them by Lunar periods in *Thomson's Annals* up to the time at which it became necessary to insert the last of the series in the present work, I determined to adopt, in future, the term of the Calendar month for their periodical appearance: considering that their comparison with those of other observers would thus be greatly facilitated, while my own object of tracing the natural periods of the different atmospherical changes, might be secured by a due arrangement of the results and averages.

OF THE
CLIMATE OF LONDON.

OF THE TEMPERATURE.

TEMPERATURE is that which constitutes the most obvious difference between climate and climate, and on which the variety of the phenomena which are exhibited by each principally depends. I shall therefore take it up here, though standing third in the tables, as the fittest introduction to the study of the whole subject: and as a comparison of the results obtained by different observers, whether for the same or for different periods of years, in the same climate, tends mutually to establish or correct their respective conclusions, I shall freely avail myself of the helps I find before me in this respect.

Of Mean Temperature in general.

To mention the differing warmths of day and night, or of the different months of the year, is simply to appeal to the test of feeling. But feeling informs us on these subjects only by a vague comparison with past sensations, the memory of which, when they have been some time past, is very imperfect. To confirm or to correct our judgment, as to the comparative warmth or coldness of different days or seasons, and still more to be able to compare climates together, with accuracy, we must be accustomed to the use of the Thermometer.

If we note the degrees indicated by this instrument when the heat of the day, by this evidence, is at the *maximum*, and again when it is at the *minimum*, and adding them together divide the sum by two, we shall have the *medium* temperature of that day, a standard by which we may judge of the temperature of another day obtained in like manner, and pronounce it warmer or colder. This standard would be more accurate, were the temperature noted at every hour, and the sum total divided by twenty-four. Although this process be seldom effected for the day, an analogous one is commonly performed for the month, when, taking the medium temperatures of the several days, we sum them up and divide by the number of days thus noted: the result is called the *mean* temperature *of the month*; it is a standard for comparing the days of that month with each other: these monthly means summed up and divided by twelve, give the *mean of the year:* which if constructed from a sufficient number of observations, carried through all the seasons, affords a criterion for judging of the temperatures of the several months of that year. A long average of these yearly means, gives a result so nearly approaching to uniformity in the hands of different observers, that it may be used as a general standard of comparison for the temperature of the day, month, or year; or of the climate in question with that of another far distant. This is called the *mean of the climate.*

Mean of the Climate of London.

If we regard the latitude, and elevation above the sea, of London, independently of local circumstances, the temperature has been hitherto rated too high; as

was that of the city itself in the earliest observations. In the "Meteorological Journal kept at the Apartments of the Royal Society by order of the President and Council," the period from 1778 to 1781 gives a mean of 52° 65. In 1787, this register being resumed after a cessation of five years, we have an account of precautions now used to secure accuracy, and the ten years from 1787 to 1796 make it .... 50° 516:
A similar period to 1806 inclusive ...... 50° 490:
A third, ending with 1816 .... 50° 364.

Mean of the City on the average of thirty year's observations .... 50° 456.

But the temperature of the *city* is not to be considered as that of the *climate:* it partakes too much of an artificial warmth, induced by its structure, by a crowded population and the consumption of great quantities of fuel: as will appear by what follows.

My own observations were conducted for the first three years at *Plaistow;* the site being about 3½ miles NNE of the Royal Observatory at Greenwich. The village is four miles east of the edge of London: it has the Thames a mile and a half to the S, and an open level country, for the most part well drained land, around it. The thermometer was attached to a post set in the ground, under a Portugal laurel, and from the lowness of this tree the whole instrument was within three feet of the turf: it had the house and offices, buildings of ordinary height, to the S and SE, distant about twenty yards, but was in other respects freely exposed.

The average of all the observations at this station for 1807, 1808, 1809, is................. 48° 848
The same for London (Phil: Trans.).... 50° 608

London warmer 1° 760.

For the next three years, the observations given in my First Volume were made, partly at Plaistow, and partly at the Laboratory situated at *Stratford*, a mile and a half to the NW; on ground nearly of the same elevation. Some of these, probably, have derived an excess of warmth from the contiguity of the instrument to a large building, in which many fires were kept: others are doubtless somewhat too low, in consequence of a change which I made in the position of the instrument at Plaistow, and which I found to have the effect of depressing the maximum. The thermometer at Stratford had an open NW exposure, at six feet from the ground, close to the river Lea.

The average of these observations for 1810, 1811, and 1812, is .... 49° 480

That at London for the same period.... 50° 949

London warmer 1° 469.

Tottenham Green, where my latter observations have been made, is four miles from the North side of London, and the country to the NW especially being somewhat hilly, and more wooded, I consider it as more sheltered than the former site; the elevation of the ground is a trifle greater, and the Thermometer was also placed higher, being about 10 feet from the general level of the garden before it, with a very good North exposure; but it was not quite enough detached from the house, having been fixed to the outer door case, in a frame which gave it a little projection, and admitted the air behind it. The former instrument having been broken, this was a different one, inclosed at first in a glass tube of an inch and a half diameter, the front of which I soon caused to be laid open, to procure a more free radiation of the heat from the instrument within.

The average in this situation for the years 1813, 1814, 1815, and 1816 is................ 48.°233

And for London during the same period 49.°741

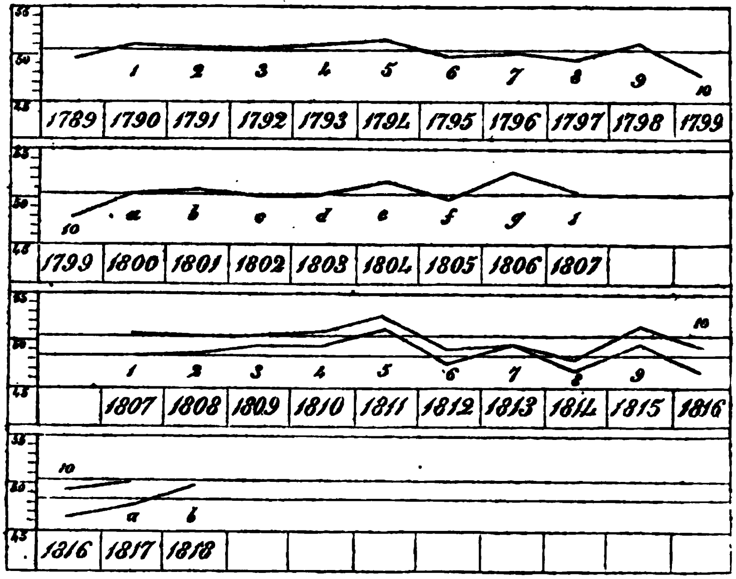
London warmer 1.°508.

Thus under the varying circumstances of different sites, different instruments, and different positions of the latter, we find London always warmer than the country, the average excess of its temperature being 1° 579. But as the same causes which produce an artificial elevation of temperature in London, must likewise influence in a smaller degree the country, the mean of which for the ten years ending with 1816 is 48,79, and as the second fractional figure was uniformly neglected in taking the monthly means for the annual average in the Register of the Royal Society, I shall for the present abate a little of the one, and add to the other; and for the purposes of comparison rate the *mean of the Latitude and level* of London at 48° 5, and that of the *Metropolis itself* at 50° 5. Future observations with Thermometers previously compared and a greater degree of care to secure the fractions, may determine these with an accuracy not as yet attainable.

Mean of the Year, and its variations.

I shall have frequent occasion in the course of this volume to present the reader with a series of results expressed by a curve; a mode of speaking to the eye which greatly facilitates the comparison of such variable quantities, when we wish to contemplate them only as becoming greater or less, and to view the order of their increase and decrease without reference to the exact amount of the sums compared.

Fig. 1.



The flexuous lines in Fig. 1 are intended to shew in this way, the variation of the Annual mean Temperature in the climate of London for the series of years from 1789 to 1818 inclusive. The three upper curves are deduced from the results of the register in the Philosophical Transactions; the lower one, extending from 1807 to 1818, from the observations detailed in my first volume, with the addition of two years published in Thomson's Annals of Philosophy, and since inserted in the present Volume. The results having been first marked over their respective years, on a scale formed by lines ruled vertically for time, and horizontally for the temperature, the curves were then prolonged from one point to the other in succession. The mean temperatures thus expressed will be found in figures in the following Table.

Annual Mean Temperature.

	In London.	In the Country.
1789	49·491	
1790	50·892	
1791	50·833	
1792	50 483	
1793	50 820	
1794	51·200	
1795	49·700	
1796	50·083	
1797	49·398	
1798	50 999	
1799	47·920	
1800	50·522	
1801	51·080	
1802	50·200	
1803	50·329	
1804	51·731	
1805	49·998	
1806	52·734	
1807	50·733	48·367
1808	50·466	48 633
1809	50·633	49·546
1810	50·976	49 507
1811	52·666	51·190
1812	49·208	47·743
1813	49·741	49 762
1814	48·241	46·967
1815	51·550	49·630
1816	49·433	46·572
1817	50·316	47 834
1818		50·028

Averages.

	In London.	In the Country.
5 years from 1790	50·845	
5 years from 1807	51·095	49·448
5 years from 1795	49 620	
5 years from 1812	49·634	48·135
10 years from 1790	50·233	
10 years from 1807	50·364	48·791
17 years from 1790	50·530	
17 years from 1800	50·600	
7 years from 1800	50·912	

Extent of variation.

In London in 30 years .. 4·814	In the Country in 12 years 4·618
Highest mean in 1806	Highest mean in 1811
Lowest mean in 1799	Lowest mean in 1816

The Mean Temperature varies, as the reader will have seen, in different years to the extent of 4 degrees and 8-tenths of Fahrenheit: a quantity certainly not considerable, when we compare by sensation the warmth of one hour of the day with another; yet capable, when added or abstracted for the whole year, of producing a decided difference in the seasons. We must not, however, too hastily connect with a low mean the idea of a cold winter, or that of a warm summer with a high one: the heat is added or taken away sometimes in one season, sometimes in another, and again occasionally almost throughout the year. But it is worthy of notice, that notwithstanding the great difference which we all find by sensation, in the warmth of the same month, week, or day in different years, summer and winter on occasion almost exchanging places, yet the total result of the seasons is so nearly uniform in each, that no one year in thirty is found by the most accurate mode of comparison to differ from another quite five degrees, and the variation from year to year is usually not half as much.

To proceed from the amount to the *manner* of the annual variation: it is for the most part such, that the elevations and depressions take place in *alternate years,* though some of them go on for two years; and this tendency to alternation is still compatible with a disposition to rise or fall on the whole through a series of years. Thus in the space from 1794 to 1799, the mean is depressed three degrees, and from 1811 to 1816 (by my own observation,) four degrees and a half: on the other hand, there is an intermitting elevation carried on, from 1799 to 1806, by which in the whole four degrees and a half are gained.

Lastly, and what is more important, there is evidence, which a few years more will perhaps render conclusive, of the existence of *alternate periods of years* in the variation.

For the reader's help in comprehending this, I have numbered in the diagram the *ten* years of a period, which appears twice in the series here recorded; and have distinguished by letters the *seven* years of another; which having completed its course between the two periods of ten years, appears to have begun again immediately after the latter of these, and to be now in progress.

To begin with 1790, we have four years of an equable heat, upon or a little above the mean of London: the same equable average years will be found, in both the London and country observations, if we begin with 1807. Then occur six years alternating in temperature, from 1794 to 1799, the first of them the highest, the last the lowest of the ten to which they belong: the same circumstances obtain in the six years from 1811 to 1816. Or, if we compare the averages deduced from these two sets of ten years, as given in the Table, p. 95, we shall find 5 years from 1790 = 50.845, and 5 years from 1795 = 49.620; difference 1.225: again, 5 years from 1807 = 51.095, and 5 years from 1812 = 49.634; difference 1.461. That is, the latter half of each period is colder than the former by nearly the same quantity; while the two periods entire, average, within an inconsiderable fraction, alike. The period of seven years from 1800 to 1806, I have already noticed as an ascending series: in this, two of the elevations go on through two years. I consider it as having probably recommenced in 1817, because that year rises above 1816, and the following year, 1818, above both; as 1800 and 1801 do above 1799.

A chasm in the Register of the Royal Society immediately previous to 1787, prevents me from bringing into the parallel a series of seven years antecedent to 1799. If this series was on the whole an ascending one, it scarcely could have ended with 1789, which is stated at a degree below the average. On the other hand it is certain from different Registers, that 1782 was as far below the average of the climate, as 1799 and 1816. The year 1787 is stated at 51·02, and 1788 at 50·63, in which depression of the mean they agree, but not in due proportion, with the corresponding years *c* and *f*, in the middle series.

On the whole, the want of observations with a self-registering Thermometer before the year 1794, throws some degree of uncertainty upon those early results; though it is probable none of them err a degree from the truth, at least if we put the artificial warmth of the city out of the question. Six's Thermometer, after having been in use at Somerset house for seventeen years, was disused towards the close of 1810: and perhaps I may not unreasonably attribute to this cause the discrepant proportions of the London curve for the following years, in one which the temperature of the city loses its accustomed excess, and is even a small fraction below that of the country.

Should the results of the present, and four following years, to 1823 inclusive, correspond sufficiently with *c, d, e, f, g,* the inquiry respecting these alternating periods may be resumed, taking in all the evidence that can be procured from early registers, and even carrying it into the corresponding years in the Meteorological Journals of other countries: for it is clear that the causes of such periodical changes in a climate must be astronomical, and not local: and this circumstance, if established, must lead us to expect occasional irregularities, and as it were intercalations, in the periods, which a long series of years can alone satisfactorily explain.

Of the connexion of a high or a low mean Temperature with the state of the Barometer, the Rain, and other phenomena of the year, it is too early to treat at present: it is sufficient to have shewn from the manner and proportions of the variation of the annual mean, that this variation is probably periodical, or that annual mean temperatures nearly approaching to each other occur at intervals, consisting of definite periods of years.

Mean of the Month, and its variations.

From the variations of the mean heat during a series of years, we may proceed to its distribution among the several months of the year, and the variations of the mean for each of them.

The general Table A, at the end of the volume, exhibits the mean Temperature of each month, in each of twenty years, ten of which, from 1797 to 1806, were taken in London, and the remainder, from 1807 to 1816, in the country.

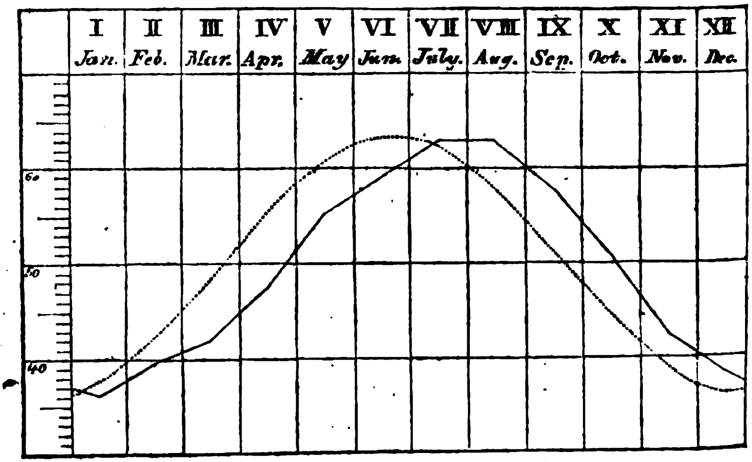
The *averages* of these mean temperatures come out as follows.

Mo.	For the city. 1797—1806.	For the country. 1807—1816.	For the whole. 1797—1816.
1 Jan.	38·52	34·16	36·34
2 Feb.	39·42	39·78	39·60
3 Mar.	42·51	41·51	42·01
4 Apr.	48·31	46·89	47·61
5 May	55·01	55·79	55·40
6 June	60·07	58·66	59·36
7 July	63·45	62·40	62·97
8 Aug.	64·45	61·35	62·90
9 Sept.	59·18	56·22	57·70
10 Oct.	51·33	50·24	50·79
11 Nov.	43·86	40·93	42·40
12 Dec.	39·76	37·66	38·71
difference of the extremes ...	25·93	28·24	26·63

The warmest month in the year therefore differs in its mean temperature from the coldest, ***on a long average,*** about twenty-six degrees and a half of Fahrenheit; and this difference is greater by nearly two degrees and a half, in the country, than it is in London.

In this long average the inequalities of temperature in the same month, which constitute the principal difference of our seasons, are in great measure extinguished, the extremes balancing each other. The series of mean Temperatures in the third column presents, therefore, a near approach to that regular gradation of heat, increasing and decreasing through the seasons, which a consideration of the primary astronomical causes of summer and winter, in temperate latitudes, would lead us to expect. To make this more obvious, I have placed in Fig. 2, a curve, constructed from the series of results in question, by the side of another represented by a dotted line, which latter expresses, on a scale of the same extent as that

Fig. 2.



of the *temperature*, the progress of the sun in *declination* through the year. As I shall have occasion hereafter to enter more at large into this comparison, I shall only request the reader to notice, here, the manner in which the Monthly mean Temperature, following at some distance the elevation and depression of the sun, advances from its lowest point in winter, through the spring months, to its greater elevation in summer; and then returns by an opposite gradation, through the autumnal months, to the point from which it set out.

But if, taking up the general Table A, we look for the same regular gradation in particular years, we shall meet with many exceptions, attended still with some appearance of order and compensation. For instance, in 1797, the temperature of the Second month scarcely differs from that of the First, and both are below the average of that month: the Third has the average temperature of the Second: the Sixth is two degrees deficient, while the Seventh has two in excess: a deficient temperature then again prevails, till at the close of the year we have an excess of three degrees. And in the country observations, in 1807, after a correct average mean in the First month, we see the Second and Third as it were exchanging places, and both cold: the Seventh, on the contrary, has a warm mean, and the Eighth a hot one; which difference in the following year is reversed in those months: then (in 1807,) we have the Ninth and Tenth almost precisely equal, while in the following year, the latter month is the coldest by nearly nine degrees: lastly, 1807, goes out, as it came in, with an average mean. A careful perusal of the Table in this way, and still better the reducing of the several years to curves, on a scale similar to that on which I have placed the mean, will give the reader an adequate conception of the manner in which the comparative coldness of one month, or season, is balanced by the warmth of another, and *vice versa;* while some years are warm and others cold nearly throughout.

If the monthly means in this Table be examined for the same month in successive years, down the column, it will be perceived (consistently with what has been stated respecting the Annual mean), that together with alternations in temperature, there are occasional gradations carried through several years, towards a warmer or a colder mean; while in a few instances, the warmest and coldest months in the series lie almost together. The greatest *extent* of these variations is marked at the foot of the column; and it is observable, that while the year scarcely differs in its mean temperature *five* degrees at most, the month is subject to a variation which in several cases amounts to *ten,* and in one runs up to *fourteen* degrees. I very well recollect, and have verified, the extraordinary warmth of the month of December 1806, on which the latter result depends: my own observations at Plaistow make the mean of this month 45·30, which, with a full allowance for the winter excess of the city temperature, comes nearly to the same thing. This year was the highest of an ascending series of seven, which I have marked with letters in Fig. 1. It was warm nearly throughout, and the heat was most in excess at its close: the cause of the excess therefore was neither a local nor a transient one.

Mean of the Month in London and in the Country, with their variations compared.

I have already stated that London has an artificial excess of heat, and shewn the average amount of this excess in the whole year. In examining the monthly *means*, to see whether it was alike throughout the year or unequally distributed, I found the latter to be the case; and that attended with circumstances of considerable interest.

Average Monthly Mean Temperature 1807—1816.

Mo.	In the Country.	In London.	London warmer.
1 Jan.	34·16	36·20	2·04
2 Feb.	39·78	41·47	1·69
3 Mar.	41·51	42·77	1·26
4 Apr.	46·89	47·69	0·80
5 May	55·79	56·28	0·49
6 June	58·66	59·91	1·25
7 July	62·40	63·41	1·01
8 Aug.	61·35	62·61	1·26
9 Sept.	56·32	58·45 *	2·13
10 Oct.	50·24	52·23	1·99
11 Nov.	40·93	43·08	2·15
12 Dec.	37·66	39·40	1·74

That the superior temperature of the bodies of men and animals is capable of elevating, in a small proportion, the mean heat of a city or populous tract of country in a temperate latitude, is a proposition which will scarcely be disputed. Whoever has passed his hand over the surface of a glass hive, whether in summer or winter, will have perceived, perhaps with surprise, how much the little bodies of the collected multitude of bees are capable of heating the place that contains them: hence in warm weather we see them ventilating the hive with their wings, and occasionally preferring while unemployed to lodge, like our citizens, about the entrance.

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* In taking out the London results for this average, I was obliged to reject that for the month of September 1815; many of the observations in this month being manifestly erroneous, and the mean at least 6° too high. The average of the month for the first five years exceeds that of the country by 1·77 only.

But the proportion of warmth which is induced in a city by the population, must be far less considerable than that which emanates from the fires: the greater part of which are kept up for the very purpose of preventing the sensation attending the escape of heat from our bodies. A temperature equal to that of spring is hence maintained, in the depth of winter, in the *included* part of the atmosphere, which as it escapes from the houses is continually renewed: another and more considerable portion of heated air is continually poured into the common mass from the chimnies; to which, lastly, we have to add the heat diffused in all directions, from founderies, breweries, steam engines, and other manufacturing and culinary fires. The real matter of suprise when we contemplate so many sources of heat in a city is, that the effect on the thermometer is not more considerable.

To return to the proportions held by the excess of London, it is greater in winter than in summer, and it sinks gradually to its lowest amount as the temperature advances in the spring: all which is consistent with the supposition, that in winter it is principally due to the heat diffused by the fires. An addition of one or two degrees being of more value on a low temperature than on a high one, I reduced the numbers in the third column of the Table to the fractional parts which they give upon those in the first; when they came out thus, beginning with the First month:

$\frac{1}{17}$, $\frac{1}{24}$, $\frac{1}{33}$, $\frac{1}{59}$, $\frac{1}{114}$, $\frac{1}{48}$, $\frac{1}{62}$, $\frac{1}{49}$, $\frac{1}{26}$, $\frac{1}{26}$, $\frac{1}{20}$, $\frac{1}{22}$.

We have here a near approach to a regular gradation, the *proportion* of excess on the lower temperature decreasing from the First to the Fifth month and then increasing again to the First. But the relations of the respective mean temperatures, with other circumstances attending them, will be best seen by means of curves.

Fig. 3.

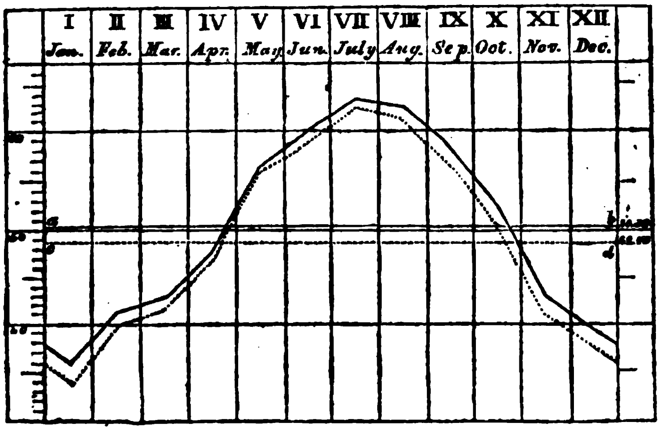
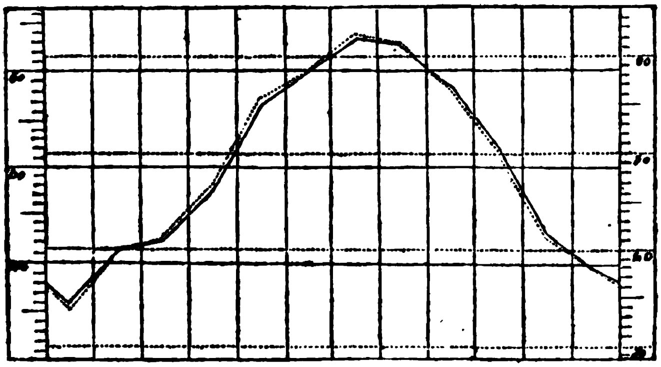


Fig. 4.



In fig. 3, the full line represents the monthly mean of London, as given in the Table, the dotted line that of the country: the horizontal lines *a b c d* are on the respective annual means; and both curves are on the same scale.

In fig. 4, the respective curves are laid down on separate scales, and that for the country temperature, which is still a dotted line, *is elevated* 1° 57, or the amount of the mean annual difference between the two; which, as the reader will have observed, brings them very near together. I shall remark first on fig. 3.

It appears that London does not wholly lose its superiority of temperature, by the extinction of most of the fires in spring: on the contrary it is resumed in a large proportion in the Sixth month, and continues through the warm season. It is probable, therefore, that the sun in summer actually warms the air of the city more than it does that of the country around. Several causes may be supposed to contribute to this: the country presents for the most part a plain surface, which radiates freely to the sky,—the city, in great part, a collection of vertical surfaces, which reflect on each other the heat they respectively acquire: the country is freely swept by the light winds of summer, —the city from its construction greatly impedes their passage, except at a certain height above the buildings: the country has an almost inexhaustible store of moisture to supply its evaporation—that of the city is very speedily exhausted, even after heavy rain. When we consider that radiation to the sky, the contact of fresh breezes, and evaporation, are the three principal impediments to the daily accumulation of heat at the surface, we shall perceive that a city like London ought to be more heated by the summer sun than the country around it.

But this effect is not produced very suddenly. For while, in the forenoon, a proportion of the vertical walls are exposed to the sun, the remainder are in shade, and casting a shadow on the intervening ground. These are receiving however, in the wider streets, the reflected rays from the walls opposed to them; which they return to the former, when visited in their turn by the sun. Hence in the narrow streets, especially those that run E and W, it is generally cooler than in the large ones and in the squares. Hence too, in the morning of a hot day, it is sensibly cooler in London than in the country, and in the evening sensibly warmer. For the hottest time in a city, relatively to the hour of the day, must be that, when the second set of vertical surfaces having become heated by the western sun, the passenger is placed between two skreens, the one reflecting the heat it is receiving, the other radiating that which it has received. Many of my readers must recollect having felt the heat of a western wall, in passing under it long after sunset.

Let us now advert to the curves in fig. 4, in order to be convinced that the same cause operates also, on the great scale of the year. In this figure, by elevating the lower scale, we have done away the mean difference of 1° 57 in the annual temperature; or in other terms made the country as warm as London. It will now be seen that the remaining difference consists principally in this: that for six months of the year, from the Second to the Eighth inclusive, the country curve holds the higher place, and for the remaining six months, the London one. This proves that, although London is always warmer than the country, *the former acquires and loses its heat more slowly than the latter,* being left behind both in the ascending and descending scale. To the same cause we may probably ascribe the remarkable fact, which appears on the average of twenty years (though not in the series of *ten* of which we have just now treated) that although the Seventh be the hottest month in the country, and on the whole average, the Eighth month exceeds it in temperature by just one degree, in London.

Extremes of the Climate.

Before proceeding to investigate the variations of the diurnal temperature, which will conduct us through the seasons, and complete this part of the subject, it will be proper to devote a few pages to the *extremes* of Temperature to which the year, month, and day are respectively subject.

The General Table B, at the end of the volume, exhibits the highest and lowest temperatures observed monthly in the country (where alone these points can be accurately ascertained) during the years from 1807 to 1816 inclusive. I have annexed to each observation the prevalent wind or winds at the time, and in some cases, where it is considered to have equally influenced the temperature, the wind of the day preceding the observation. The maximum and minimum of the year will be readily found by the marks * and † affixed to them.

Of the extremes of cold, the far greater number occur in the First month, only two being in the Twelfth and one in the Second. The extremes of heat are more diffused: only five of them fall in the Seventh month, and the remainder in diminishing proportion earlier and later in the summer. Thus of the whole twelve, there are only two months in spring and two in autumn, which are not occasionally subject to one or the other annual extreme of Temperature.

The Thermometer stood in the year

						Range		Medium
1807	at	87°	and	13°	....	74	....	50
1808	....	96	....	12	....	84	....	54
1809	....	82	....	18	....	64	....	50
1810	....	85	....	10	....	75	....	47·5
1811	....	88	....	14	....	74	....	51
1812	....	78	....	18	....	60	....	48
1813	....	85	....	19	....	66	....	52
1814	....	91	....	8	....	83	....	49·5
1815	....	80	....	17	....	63	....	48·5
1816	....	81	....	—5	....	86	....	38
Averages	.....	85·3		12·4		72·9		48·85

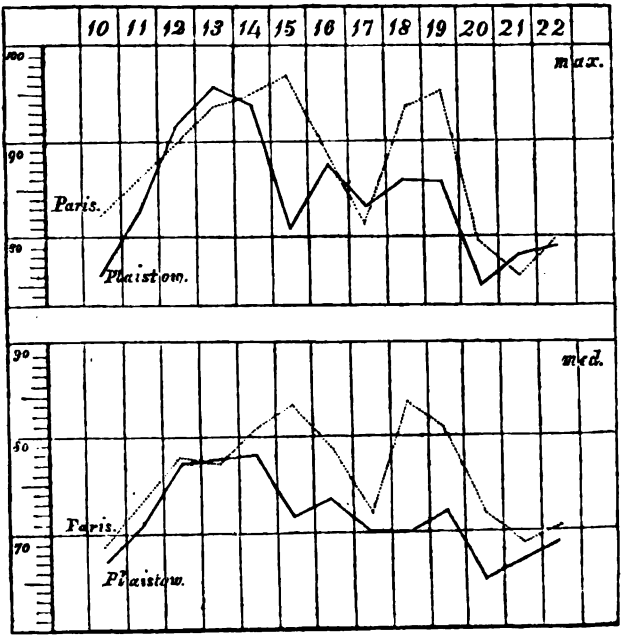
I have before stated the mean Temperature of the country, on the average of all the *daily* extremes, or which amounts to the same thing, of the medium of each day, during the above ten years, at 48° 79. On the average of all the *monthly* extremes in Table B it is 48° 34: and on that of all the *yearly* extremes as given above 48° 85. Even the greatest heat and greatest cold, in these ten years, diverge to nearly equal distances from the mean of the climate.

This agreement in the different averages is certainly remarkable: it gives further probability to the opinion that these years form a series, comprising a revolution of Temperature complete in itself: it is likewise a striking proof of the utility of a self-registering Thermometer. It is possible that in the Thermometer of Six we possess an instrument, which being merely fixed to a post, and properly defended from the sun's rays and from accidents, in an uninhabited country, where it could be visited and adjusted by navigators once in every year, would give in a moderate run of years, with considerable accuracy, the mean temperature of the latitude and elevation where it stood. In like manner might an accurate comparison be made with little labour, at the summit and at the foot of mountains, of the mean temperature of the several months at different elevations. When Meteorology shall become a science and be studied by navigators, travellers, and men of competent skill engaged in local surveys, experiments of this kind will perhaps be as common as the taking of levels and angles and observing the motions of the heavenly bodies, for the perfecting of Geography and Astronomy.

To return to the extremes of our own climate for the last ten years—the day of *greatest heat* within my observation was the 13th of the Seventh month, 1808, when I was attentive for many hours to the phenomena; of these the reader will find notes, (which

Fig. 5.

Seventh Month, July, 1808.



would have been more copious had I been aware at that time of their importance) under Table 21 in the first volume. To prove the extensive action of the combined causes of this excessive heat, I shall here compare by means of the curves in fig. 5, the maximum and medium temperature at Plaistow with that at *Paris* (distant 180 miles to SSE) for the space of thirteen days in which the principal elevation of temperature took place.

The maximum at Paris on the 10th of Seventh month (see the Notes abovementioned) was 82° 6, the wind NW: that at Plaistow on the same day was 76°, the wind SW. During the three following days, the heat at each station increased steadily, the wind at Paris being E & SE, and at London S & SW. On the 13th, when the thermometer with us had risen to 96°, the evening atmosphere presented *dew* to the SE, and some traces of *thunder-clouds* to the NW: the change then was approaching from the latter point, while the atmosphere of Paris remained as yet undisturbed: its heat was below ours, being only 93° 8, and it did not reach its climax till the 15th, when the thermometer there rose to 97° 2, and fell only to 70° at night, the wind SE. In the mean time distant thunderstorms to the Westward, and one in particular about Gloucester, of a character for intensity suited to the exaltation of the predisposing causes, reduced *our* maximum in two days to 81°, with the wind at NE. In two days more the change thus propagated from the Westward appears to have reached Paris: *they* were cooled down on the 17th, to 81° 5 by day and 62° 7 by night. Immediately after this, a second elevation of temperature took place with them, which was felt also in a less degree at London, on the 18th and 19th: lastly the heat at both places went down to the ordinary summer standard, by a SW wind introducing rain.

The mean heat of this period of thirteen days at Paris was, by day 87° 69, by night 63° 92, on the whole 75° 80: the mean at London (Plaistow) was by day 84° 38, by night 58° 77, on the whole 71° 57. Thus Paris had on the whole (consistently with its more southern latitude) about 4¼ degrees more heat than London, yet with variations throughout strikingly analogous to our own: till on the 22d, with the same winds in play at each station, the temperatures of the two become nearly equal: in which situation, although the comparison might have been further prosecuted, we may leave them.

This heat was not with us of the sultry oppressive kind which commonly ushers in a thunderstorm: the sky was serene and a fine breeze prevailed, yet such was the ardour of the sky, that motion was unpleasant and labour in the sun dangerous: the feather'd tribes were mute by day, and revived by the freshness of the night were heard singing by moonlight. In the evenings the *dew* fell pretty freely, and at temperatures which in ordinary circumstances would have sufficed instantly to dissipate it: but the production of this phenomenon depends at all times, not on the absolute but on the relative temperature of the calm evening air after a warm day; and if this be cooled 20° or 25°, it matters not whether it were previously charged with water at 55° or 95°, provided the refrigeration pass that degree at which the whole quantity can no longer subsist as vapour.

I had equal opportunity of observing at Tottenham the *intense cold* of the 9—10th of Second month 1816, respecting which I need not enlarge here, having given already a pretty long note on the subject, under

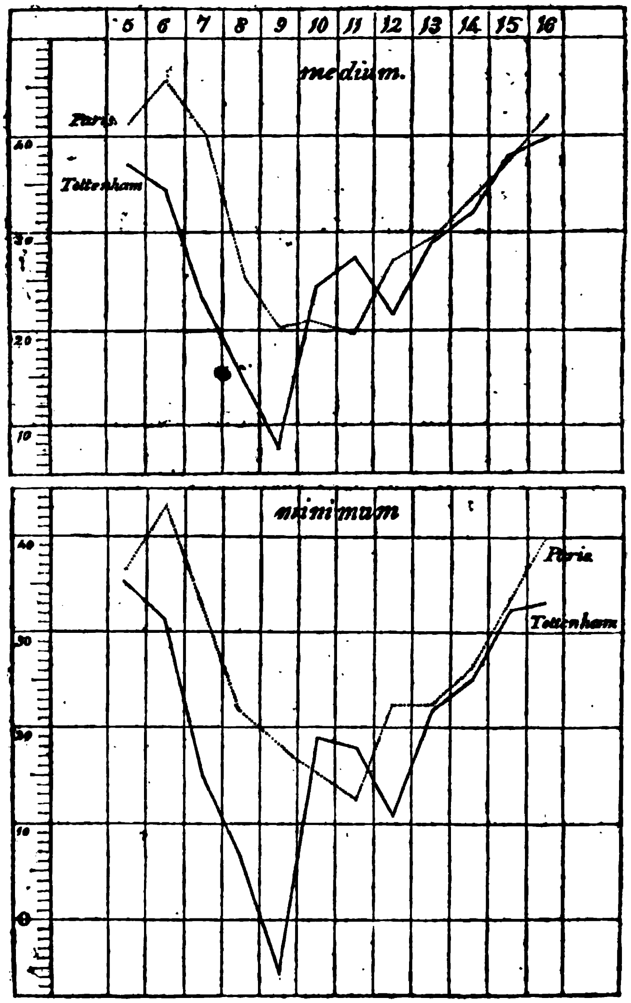
Table 115, vol 1. We had on this occasion likewise in the day time a clear atmosphere: a gale from the NE had precipitated in snow the moisture which previously abounded, and which had twice in the space of a few days brought the hygrometer to 100°. So cold was the surface on the 9th at noon, that a bright sun, contrary to its usual effect in our climate, produced not the least moisture in the snow, the polished plates of which retaining their form, refracted the rays with all the brilliancy of dew drops: the thermometer in these circumstances reached only to 20°, or *seventy-six degrees* below the temperature of the middle of the hot day I have described: in the night it went down (in its usual position) to minus 5, and there is every reason to believe that the mass of our atmosphere was on this occasion at a temperature below zero for about twelve hours. This is a state of the air not uncommon, I believe, for several days together, on the continent in higher latitudes, but with us it is happily, of necessity, very rare and transient.

A comparison of the observations at Tottenham with those at Paris will again furnish some curious coincidences. I shall present the minimum and medium of each in curves, as before, and insert here the temperature at Paris reduced to Fahrenheits scale, from the observations of Bouvard in the Journal de Physique: my own as to the daily extremes, will be found in their place in the first volume: the daily *medium* I shall annex here.

The mean temperatures at the two places for the period occupied by these observations, appear to bear very nearly the same proportion to each other as in the former series; Paris being 4° 67 warmer than London.

Fig. 6.

Second Month, February, 1816.



		At Paris.				At Tottenham.	
1816.		MAX.	MIN.	MED.	WIND	MED.	WIND.
Second Mo.	5	45·68	36·50	41·09	W	37·00	S
	6	48·65	43·25	45 95	SW	34·50	SE
	7	48·65	32·45	40·55	SW	23·00	NE
	8	30·20	21·65	25·92	NE	15·50	N
	9	22·10	18·25	20·17	NE	7·50	E.
	10	26·15	15·35	20·75	ENE	24·50	SW
	11	27·05	12·65	19·85	E	27·50	N
	12	35·60	22·55	29 07	NE	21·50	N
	13	36·50	22·55	29·52	NE	29·00	Var.
	14	41·00	26·15	33·57	N	32·00	W
	15	41·45	33·65	37·55	WNW	38·00	SW
	16	44·60	39·65	42·12	W	40·00	NE
Mean of 12 Days				32·17		27·50	

A slight *elevation* of the nocturnal temperature on the 5th at Tottenham, was followed by a corresponding but more considerable one, at Paris on the 6th: it was misty with some rain at both. On the evening of the 6th, the rain with us by the change of the wind became sleet, and finally snow, which fell in the night in great quantity, and at intervals in the day after; while there was still only rain at Paris. The North-Easterly gale did not set in there until the 8th, and the depression of temperature, with the snow, was late in proportion. This depression, which on the first days proceeded as rapidly with them as with us, appears to have experienced a check, at the time when our own temperature was at the lowest, and we find the *extreme* of cold at Paris *two* days later than at London: it is moreover not by any means proportionate to the difference in the mean temperature of the two places, reaching only to about 13°.

In the subsequent rise of the Thermometer we see Paris take the lead of London, contrary to the order in the beginning of the series: there is a second depression also in the Tottenham curve, from a cause which is felt more slightly and somewhat later at

Paris. Lastly, when the frost is actually going off and a Westerly wind makes its appearance at both stations, we see the elevation of temperature at each go on together.

Probable conditions of each extreme of Temperature.

Let us now review the case of each extreme of temperature in our climate, and see what conditions appear necessary to its production: and first of the *extreme of heat.*

To produce the highest possible temperature in our climate, there appears to be required,

First, a *clear atmosphere* at the time: that the sun's rays may have the freest possible access to the earth's surface.

Secondly, a *dry* and *warm* state of the *soil,* to some considerable depth; that the earth may reverberate freely, without throwing up such a quantity of vapour as by its speedy condensation, in the higher and colder regions of the atmosphere, might produce cloudiness and annul the first condition.

Thirdly, these two causes must concur at a season when the sun is not far from his greatest elevation: otherwise the heat will be in excess, only relatively to that season of the year in which it occurs.

Fourth and lastly, to carry the heat to the very highest point, we must receive, at this crisis, by means of steady southerly breezes, the air of the Southern parts of Europe, while these in their turn are supplied from Africa, and the South of Asia. A wind of this kind, which would travel from Paris to London in a day, would reach us in a week from the tropic of Cancer.

To produce the *lowest possible temperature* in our climate there is required, First, as in the former case, a clear and dry atmosphere at the time, that the heat may freely escape by radiation: this condition will be best appreciated by those who have read the experiments of Dr. Wells, on the subject of the radiation of heat from the earth's surface.

Secondly, a cold state of the soil, (the usual result of previous cloudy, wet and frosty weather), and this to some considerable depth: that the sun's rays may not be assisted by any warmth from beneath, in raising the temperature by day.

Thirdly, the concurrence of these two causes with a sufficiently low state of the sun, and consequent length of night: otherwise the cold, although severe for the season, will not be such as to be remarkable in comparing together the results of a series of years.

Fourthly, a cause must concur, which but for the parallel which I wished to exhibit, between certain conditions common to the two cases, I should have placed first—the winds must come to us from the Northward; when if they blow with sufficient steadiness, we may receive them at length from Siberia.

When this state of the wind has supervened upon our mild winter weather, it speedily gives us a serene atmosphere: our moisture is first precipitated on the meeting of the two currents, in an abundant snow, the latent heat of the vapour being given out to the air; which passes with it to leeward. The air which succeeds, coming from a still colder region, and being intensely dry, our own ice and snow evaporate into it, and there is thus, towards the close, a contrary effect—an absorption of heat, which undoubtedly contributes to carry the depression to its extreme point.

It may seem extraordinary, in the case I have just reviewed, that at such a distance from the winter solstice, the power of the sun should not have prevented, in a greater degree, the effect of the Northerly current. But we have probably, here, an effect similar to that which takes place in a single night of frost: the temperature (as is well known) is then often lowest just before sun-rise, the nocturnal depression, an effect of the sun's absence, continuing to go on until the approach of his rays becomes again sensible: so in the present case, the long time during which the sun had been low, may be admitted among the predisposing causes of the extreme depression—which in all probability, would not have been produced by the concurrence of the other causes, at an equal interval *before* the solstice. I find that the depression in 1796 to — 6,5 which I mentioned in the note to Tab. 115, as analogous to the present, occurred in the night between the 24th and 25th of December*, just after the winter solstice: it was preceded by a heavy snow on the 23d, and a clear day on the 24th, with the temperature at 23° at noon.

Such are the causes, the concurrence of which appears requisite for the production of the extremes of temperature in our climate: and they will probably be found to obtain, more or less, in most of the cases of great heat and excessive cold recorded in our Registers. The history of the means by which the equilibrium is restored, and the temperature made to approximate again to the ordinary state of the season, is more simple. It appears to be effected, *in both cases,* by an irruption on land of the more temperate air of the Atlantic. In effect, a SW wind was no sooner established, than the heat in one case, and the frost in the other, gave place to its influence.

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* Extracts from a Meteorological Journal kept at Edmonton, Middlesex. By John Adams, 1814.

By admitting this reaction of the Atlantic atmosphere, we are able to solve the problem of the maximum of temperature, in one case, and the minimum in the other, falling two days *later* at Paris than at London; in consequence of which, on a given day of the cold season, it was colder by several degrees at Paris than at London, and on another in the hot season, warmer at London than at Paris: for the latter city, lying more remote from the Atlantic than London, and in the midst of a larger mass of atmosphere resting on a continent, and more difficult to displace than our insular air, was in consequence later in receiving the change: and the causes, whether of elevation or depression of temperature, continued to operate during the interval.

To conclude, it will appear on examining the Table B throughout, that our warm weather *in winter* has almost uniformly come from the SW, the S, and W: but *in spring and summer* as frequently from the S and E: and that with regard to the cold extremes, a large proportion of them are connected with a NW wind, which in some instances is set down NW a N, (North-west *after* North). The reason of this connexion may be, that after the wind has been for some time North East or North, it has shifted to the NW just before the change to the Southward, and when (from a cause before explained) the cold by continuance arrives at its greatest intensity for the time.

Extremes of Day and Night.

The difference between the temperatures of day and night, or between the higher and lower extreme of the twenty-four hours, is subject to great variation. Sometimes from the effect of a steady wind with cloudy weather, or of slight frosts with snow, the temperature will scarcely vary five degrees in twenty-four hours: at others, a clear night succeeding to a day of much sunshine, or the sudden going off of severe frost, by a change of wind, shall cause a variation in either direction, of twenty, thirty, or more degrees. The reader will find many examples of these changes, in examining the periods about the middle of winter and beginning of summer. To give a few instances: Tab. 88, Dec. 4—9; six days with a uniform maximum of 44°, and the nights mostly but three or four degrees colder: Tab. 40 and 41, many days in First month very uniform: Tab. 21, three days at 92°, 96°, 94°, and the nights at 63°, 60°, 63°, respectively: Tab. 144 (in the present volume) several nights, in the fore part of the Sixth month, in which the thermometer was lower, from 35° to 37°, than in the day: Tab. 116, Second month, 9—10, a rise from —5 to 30°: Tab, 136 (in this volume) Tenth month, 29—30, a rise from 27° to 57°: again, Tab. 131, Fifth month, 15—17, the nights at 33°, the days at 65° and 67°.

Extremes of Day and Night in London and in the Country.

But it is by mean results in this, as in several previous cases, that we arrive at the clearest view of the subject. In the two Tables, p. 134 to 137, I have given under the titles *Higher mean*, and *Lower mean*, the Monthly averages of the daily *maxima* and *minima* of the Thermometer for twenty years: ten of them in London, and the following ten in the Country. A mean of these numbers being taken for each month, on each set separately, the following results are afforded.

The higher mean, or *heat of the day,* taken on the observations from 1797 to 1806, *in London,* is 56° 17: the lower mean, or *cold of the night,* on the same, 44° 80.

The higher mean *in the Country,* taken on the observations from 1807 to 1816, is 56° 51; the lower, 41° 10.

The mean variation of temperature, from the heat of the day to the cold of the night, is therefore

In London	11° 37
In the Country	15° 40
Greater mean variation in the Country	4° 04

The close coincidence in the averages of the *heat by day,* in London and in the Country, for two different decades of years, is certainly remarkable. I am prevented from forming an accurate comparison *on the same set* of years in either case, by the want of a complete series of observations with Six's Thermometer; without which it is useless to attempt a parallel of the *extremes* of temperature.

Now, as to the *nights,* 44.80 — 41.10 = 3.70: and we found before an excess for London, *on the mean of twenty-four hours,* of 1.47, which doubled (as it was halved by taking the medium) is 2.94. This difference in the average of the nocturnal extreme, exceeding the difference on the total average of mean temperatures, makes it probable that the excess of London, however acquired, is retained in such a way as to operate chiefly on the lower observation, entering but in a small proportion into the maximum. And, in effect, the averages at the bottom of the columns in the *Lower mean* table, shew that the nights in London, are at all times so much warmer than in the country, that no difference of seasons in ten years is able to reduce them below the latter in the average. Whereas, in the *Higher mean,* from the cause just mentioned, the monthly average of London is sometimes above, sometimes below, at others nearly parallel with the country one.

Extremes of Day and Night in the several Months of the year.

It is natural to expect that the difference between the temperatures of day and night should increase, in proportion as the sun acquires more power by elevation; or that it should be greater in summer than in winter. The following Table, drawn from the two general ones to which I have just now referred, will shew to what extent, and in what proportions, this difference proceeds through the seasons. In constructing it, I have preferred the long average, which includes ten years in London: and have obviated the effect of the local warmth of the city, by deducting its excess, not from the mean of twenty-four hours, but, (on the ground of the preceding examination) from the *lower* mean exclusively. Thus, the average of the lower mean on ten years in London being for the first month 35·44; that of the higher mean 41·61; and the two for the country, respectively, 29·33 and 38·96, the calculation for this month runs as follows:

35·44 — 2·04 (see page 103) = 33·40
33·40 + 29·33 = 62·73 ÷ 2 = 31·365
41·61 + 38·96 = 80·57 ÷ 2 = 40·285
40·285 — 31·365 = 8·920, the difference between the higher and lower mean of the month on 20 years: and so for the remaining months.

Mo.		Mean of greatest heat by Day.	Mean of greatest cold by Night.	Difference,
1	Jan.	40·285	31·365	8·920
2	Feb.	44·635	33·700	10·935
3	Mar.	48·085	35·315	12·770
4	April	55·375	39·420	15·955
5	May	64·065	46·540	17·525
6	June	68·360	49·750	18·610
7	July	71·500	53·840	17·660
8	Aug.	71·235	53·940	17·295
9	Sept.	65·665	48·675	16·990
10	Oct.	57·060	43·515	13·545
11	Nov.	47·225	36·495	10·730
12	Dec.	42·660	33·900	8·760
	Averages	56·345	42·204	14·141

The third column presents, we must remember, a series of differences between the average extreme temperatures of day and night, divested as far as possible by compensation, of the disturbing effects of different winds, of cloudy or clear days, of the presence or absence of rain or snow, and of the variable pressure of the atmosphere.

We find accordingly in these numbers a gradation which agrees pretty well with that of the Sun's declination. The greatest difference is found in that month in which the Sun is highest, and longest above the horizon; the least, in that in which he is least elevated, and makes the shortest stay with us. But there are other circumstances, not so obvious, connected with the proportions of these numbers, which we are not yet prepared to discuss. It may suffice therefore to consider them for the present, as *an approximation* to a series, representing, in degrees of Fahrenheit's thermometer, the mean quantity of heat, actually produced by the direct and reflex action of the Sun's rays, in each month of the year.

Diurnal Mean: variation of the daily heat through the Seasons.

Perceiving, very soon after I had begun to investigate the Temperature, the necessity of a fixed standard, with which to compare the very considerable variations in the mean heat of the same day, in different years, I determined on constructing a set of Tables applicable to this purpose. I then possessed Observations on the Thermometer in the country for ten years: and as it was certain that the temperature of the year did not reach both extremes of its variation in so short a period, it appeared needful to take into the average the ten preceding years from the Register of the Royal Society. The method employed in forming these tables was, to set down the higher and lower observation of each day, under the day, through the month; then, to repeat the operation for the same month in the next year; and so on for ten years. The average of the sums in each *column* then gave the mean heat of the *day* for ten years, and that of each *line* in the table, the higher and lower mean alternately for the *month*. The *monthly means for ten years* being then deduced, both from the final column and from the line of averages at bottom, the agreement of these, within certain limits, was considered as proving sufficiently the correctness of the calculation. A similar set of averages being likewise deduced from the country observations, the medium betwixt the two was taken for a general standard of the diurnal and monthly temperature of the climate. See the Tables, p. 138 and 143.

The circle of Temperature for the year being thus obtained in figures, I became curious to see how it would appear in a diagram, and what relation it would bear to a circle, placed within a scale of the same extent, and representing the sun's progress in *declination* through the year. This inquiry, not to trouble the reader with an account of its progress, terminated in the construction of the scheme of temperature and declination, contained in the two copies of Plate 1, facing the Title-page, which I shall now proceed to describe. The reader will first avail himself of the copy least coloured; as we have to do at present only with the lines and figures.

The diagram, as the reader will have perceived at once, presents a circular scale for the year, divided (except where the termination of the months required a difference,) into intervals of five days. Each of the lines forming these divisions forms likewise a scale of temperature; being cut at equal intervals by the concentric circles, which are distant from each other five degrees of Fahrenheit; the *highest* part of the scale being *within*, or towards the centre, the *lowest*, *without*, or towards the circumference. Just without the circle representing 50°, is another formed by a strong dotted line: this is placed on the *mean of the climate*; and with reference to the declination, it represents also the *Equinoctial* or *Equator*. The circle representing the sun's delination through the year, would be readily found by its being so greatly eccentric: it is however further marked by the word *Ecliptic*, and by the signs of the Zodiac, with degrees of declination marked at intervals. The North declination is made to proceed towards the inner or upper part of the scale of Temperature, the South towards the outer part, or bottom; the extreme distance from the Equinoctial each way, (or 23° 28′,) being equal to 15° of the Thermometer.

Having thus far explained the figure, I must now request the reader's attention to the circle formed by a flexuous line, which traverses the scale through the year, and presents the same eccentric appearance as the circle of declination. This is the curve of the daily mean Temperature, prolonged through points marked for each day on the scale. On a general view, the reader will perceive that, like the circle of declination, it is highest in Summer and lowest in Winter, and that it crosses the mean line twice, in Spring and again in Autumn: but not at the same time with the declination, being about a month later. If we trace the correspondence of the two circles, we shall find this difference in time to obtain throughout the year.

At the Autumnal Equinox, on the 23d of September, (to omit for a while the numerical designations of the months,) the Sun being in Libra, we have the diurnal Mean Temperature at 55°, or six degrees above the Mean of the year; to which it does not attain in its gradual descent, until the 22—23 October, when the Sun, advancing in South declination, has nearly reached the first degree of Scorpio.

Proceeding through the next two signs to the Winter Solstice, the declination, keeping in advance of the Temperature, arrives at its South extreme on the 22d of December, the Sun in Capricorn: but the Temperature does not reach its lowest point (at 34,45) until the 12th of the following month, And as the declination varies but little for a considerable space about the Winter Solstice, so we have here a sameness in the line of Temperature, which after a small elevation, almost revisits the cold extreme on the 25th January. The lowest Temperature of the year may therefore be said to occur, about the time when the Sun enters Aquarius. During this time, the declination having proceeded Northward a few degrees, the two circles coincide, and for a considerable space, the variable curve of the Temperature intersects, at intervals, the regular one of declination. As the season proceeds, the latter takes the lead in rising, the divergence of the two lines increasing up to the Vernal Equinox, 21st March, the Sun in Aries; thirty days after which, at his entrance into Taurus, the Temperature is about to touch the mean of the year; which it crosses on the 24—26th April. The ascending Temperature now follows the declination, keeping the same distance as before, to the Summer solstice, (22d June, the Sun in Cancer,) but the Temperature at this time is at 58° 85, or six degrees short of its higher extreme. When the Sun, having passed his greatest elevation, has declined a little towards the South, the two circles coincide as before, and with the same solstitial character (if I may so use the term,) in the curve of Temperature; which continues here for a longer time about the same level; insomuch that the local excess of London causes the hottest *days* to appear in the beginning of August; whereas in the country they are the 12th and 25th of July; which, with greater consistency places the hottest season in the space between those days, or about the Sun's entrance into Leo.

From this time the declination falls in the scale, keeping in advance of the temperature, and the divergence of the two from each other increasing (as before in Spring,) down to the Autumnal Equinox: from which point, it will be recollected, we set out in the comparison.

Thus, the average of each day upon the observations of twenty years, though made under the disadvantage of a local cause, irregularly raising the Temperature in one half of them, has furnished a practical proof of that which was before admitted in theory, that *the diurnal Temperature*, abating the influence of temporary causes of variation, *is determined by the Sun's altitude at noon throughout the year.*

The curve of the Mean Temperature, we may observe, scarcely ever rises or falls uniformly for a week together; but is continually interrupted by deviations. Yet the general effect so nearly agrees with the progress of the Sun, that, were the circle of declination shifted, and its centre made to coincide with that of the curve of temperature, the latter would cross the former in more than fifty places, besides a great many in which they would be in contact. Setting aside the effect of the local excess of London, these deviations appear to be the result of the different winds, which prevail at the same season, in different years, producing very considerable elevations and depressions of temperature, which however do not perfectly balance each other in the average of twenty years chosen for my tables. I suppose that a very long average, or one taken from a real natural period of years, and in which local influence on the Thermometer should be avoided or allowed for, would bring out a curve much more nearly resembling the circle of declination. And it is now proper to observe that the latter is not a true circle. For, there being seven days more on the Summer than on the Winter side, a true circle would not have intersected the Equator at the Equinoxes, while it departed to an equal distance from it at either Solstice. It is therefore somewhat oblate, or partaking of the form of a circle of larger diameter, in the Summer months: and there is every reason to conclude, that the true theoretical curve of the diurnal Mean Temperature, will in the end be found to have the same disproportion between the half of the circle above, and that below, the Mean Temperature of the year.

Natural commencement and duration of the four Seasons.

The fact of the mean and extreme temperatures occurring with so regular a relation to the Equinoxes and Solstices, yet at so considerable a distance after them, has suggested to me a new and more natural demarcation of the limits of the seasons of our climate: which I have now, with the help of the *coloured* plate, to lay before the reader.

It is clear that in these latitudes we have four seasons, distinguishable by the rest and progress of nature in the vegetable world. We have a germinating leafing *Spring*, a flowering *Summer*, a fruit-bearing *Autumn*, a dormant naked *Winter*. Now, the difference of these from each other depending chiefly on the temperature, as to its elevation and the direction in which it is proceeding, in those parts of the year in which they severally take place, if we can divide the yearly circle of temperature in such a way as shall at once make its four parts symmetrical, and bring them more nearly to accord in time with the natural appearances abovementioned, a departure from the customary divisions of the "Quarters" of the year in our calendars, will by the natural philosopher at least be cheerfully tolerated.

Let us then remove the beginning of the seasons *fifteen days* in each case from their respective present situations, placing them at that distance *before* the Equinoxes and Solstices.

SPRING will then begin the 6th of the Third month, *March*, at the temperature of 39° 94[*] (see the Table,

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[*] The initial and terminal temperature of the season is taken, in every case, at a *medium* between the day on which the one season ends, and that on which the other begins: thus $39.67 + 40.28 \div 2 = 39.945$: and so of the rest.

p. 142—143), it will occupy 93 days, and will end on the 6th of the Sixth month, *June*, at 58° 08—the temperature having risen 18° 14 degrees.

Summer will begin on the 7th of June, and it will last 93 days; during which space the mean temperature will have risen from 58° 08 to 64° 75, or 6° 67; and have declined again 6° 59: it will end on the 7th of the Ninth month, *September*.

Autumn, beginning on the 8th of September, at 58° 16; will have 90 days: during which, the mean temperature will have declined 18.35 degrees, and it will close on the 6th of the Twelfth month, *December*, at 39° 81.

Winter, comprehending 89 days (or in leap years 90) will begin December the 7th. During this season the mean diurnal temperature having fallen 5° 36 to 34° 45, will have risen again 5° 49 or to 39° 94, on the 5th of the Third month, *March*, the concluding day of the season.

To make the symmetry and proportions of the seasons, as thus distributed, more obvious to the sense, the plate has been coloured thus:—the space between the line of the annual mean and that part of the variable curve of daily temperature which lies *above* it in the scale, is made *red*: this space may be considered as representing the *heat* of the year. The space betwixt the mean line, and the curve of the daily temperature lying *below* it, is coloured *blue*, and may be considered as representing the *cold* of the year. The remainder of the ground of the scale being filled up with four colours, appropriate to the seasons, they are thus marked out from each other like the countries in a map. The Summer is seen at once to contain the largest portion of the sensible heat of the year; which after increasing to the middle of that season, decreases again to the beginning of Autumn. In this season, the *heat* gradually goes out, and is succeeded in the middle by sensible cold, which becomes considerable by the end. Winter exhibits as large a proportion of the cold as summer did of the heat, and with the like increase and decrease. In Spring, we see the cold gradually go off, to be replaced in the middle of the season by warmth; their respective proportions being like those which obtain in Autumn, while their positions are reversed. Lastly, by the beginning of summer (with which we set out) we see the heat increased to a degree sufficient again to constitute that season.

Cause of the difference between the Astronomical and the real sum of heat; or between the Sun's declination and the Temperature.

It remains for me to shew why the Temperature, both in its increase and decrease, is always a month behind the Sun.

The heat existing from day to day in the portion of our atmosphere next the Earth, is at no time the simple product of the direct action of the sun's rays on that portion. It has been found by experiments carefully conducted, and continued for a great length of time, that the direct action of the sun's rays, in a calm air, will raise the Thermometer an equal number of degrees, whether the time be the summer or the winter solstice, whether the temperature be at summer heat or near the freezing point.* It is therefore probable that the mass of the air is similarly affected, and that the proportion of heat which it derives from the direct passage of the rays is alike in all seasons. The accumulation of heat near the surface of the Earth, which we always experience from continued sunshine, is evidently due to the stopping of the rays at that surface; to their multiplied reflections and refractions, in consequence of which they are as it were absorbed and fixed, for a time, in the soil and in the incumbent atmosphere. By this process the Earth, when in a cold state at the end of Winter, *becomes gradually heated to a certain depth* as the warm season advances. On the other hand, when the Sun declines, in Autumn, the soil thus heated acts as a warm body on the atmosphere, and *gives out again the heat it has received.*

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* See a copious paper on the subject by Flaugergues. *Journal de Physique*, Octobre, 1818.

The Thermometer is therefore placed betwixt the Sun and a reflector, the Earth; and the heat which it indicates is at all times the product of the compound action of the two bodies. Now, if I place a flat skreen suddenly before a clear fire, I shall not need a Thermometer to learn, that at the first moment the skreen reflects no heat into the space between them: it requires first to be heated itself, that is to say, the rays which first fall on it are for the most part absorbed: but as soon as heated it reflects copiously. It is thus with the Earth's surface: it is a skreen behind the Thermometer, which absorbs heat during the Spring, and gives it out again in Autumn.

Were it not for this effect on the part of the Earth, the heat indicated by the Thermometer, would probably on a long average (to obviate the remaining irregularities, caused by clouds, rain, wind, and evaporation) be precisely at its maximum and minimum at the Solstices, and at the mean at the Equinoxes. For the power of the Sun is proportionate to the quantity of parallel rays falling on a given area of the

Earth's surface. And this quantity is greatest when they are vertical, and diminishes as they become more oblique; till in a perfectly horizontal position of the rays, it is null. On this principle depends the superiority in heat, of noon over morning or evening, of our summer over our winter, and of the tropical over the polar regions. As the Sun advances in North declination, therefore, the heat we derive from him increases, actually in proportion to his altitude, but not sensibly; because a part of it is required to heat the Earth, and is lost there by absorption. As he declines Southward in the Autumn, the heat we receive actually grows less in proportion, but not sensibly; because we now receive back a certain quantity from the warm Earth. And it would appear that, were the Earth's surface at a mean temperature, and were the Sun's rays suddenly and totally intercepted for the time, it would require about thirty days to be cooled down 7 degrees, or the difference between the temperature by the Sun and that by the Thermometer, and about the same time to be heated to the former temperature, on their return.

To make this effect also more sensible, I have coloured, in one of the Plates, the spaces between the curves of declination and temperature, *blue* on the side of the year towards Spring, and *red* on that towards Autumn: the one to represent the cold produced by absorption in the former season, the other the heat derived from radiation in the latter.

HIGHER MEAN IN LONDON.

Year	1. Jan.	2. Feb.	3. Mar.	4. Apr.	5. May	6. June
1797	40·00	42·46	45·70	54·06	61·96	65·93
1798	43·16	44·78	48·45	59·10	64·32	72·80
1799	38·12	42·60	43·70	49·06	59·35	65·66
1800	41·64	39·28	44·12	56·36	64·31	64·83
1801	44·97	43·96	51·35	55·46	63·35	68·90
1802	38·09	44·67	49·61	58·63	60·54	67·56
1803	37·45	42·00	49·87	57·30	59·35	65·50
1804	47·84	43·00	48·09	51·73	66·77	71·80
1805	38·87	44·82	49·67	54·56	59·90	65·20
1806	46·00	47·53	46·54	51·10	65·67	70·90
Average of 10 years.	41·61	43·51	47·71	54·73	62·55	67·90

Year	7. July	8. Aug.	9. Sept.	10. Oct.	11. Nov.	12. Dec.
1797	74·80	70·03	63·55	53·61	48·03	46·32
1798	71·64	73·25	65·26	57·32	45·40	38·00
1799	69·06	67·61	62·70	54·35	48·26	36·32
1800	74·42	75·19	66·03	55·25	48·13	43·00
1801	70·93	73·38	66·63	57·74	45·46	41·06
1802	66·96	76·35	68·46	58·67	45·66	42·77
1803	74·67	72·64	63·43	56·19	47·70	45·38
1804	69·71	70·03	68·50	58·54	48·80	39·83
1805	69·09	71·96	68·56	54·19	45·56	44·00
1806	70·70	71·87	66·03	58·03	53·06	51·06
Average of 10 years.	71·19	72·23	65·91	56·38	47·60	42·77

the Year . . . . 56·17

HIGHER MEAN IN THE COUNTRY.

Year	1. Jan.	2. Feb.	3. Mar.	4. Apr.	5. May	6. June
1807	40·42	45·71	43·35	55·80	65·06	69·33
1808	41·12	41·55	43·00	50·50	70·29	68·43
1809	40·51	50·71	50·64	50·20	67·51	68·20
1810	38·58	44·64	49·51	57·13	61·06	71·96
1811	37·45	47·50	54·70	61·13	70·54	71·83
1812	41·54	47·58	46·93	52·20	62·87	64·20
1813	39·16	49·57	51·67	58·10	65·64	69·53
1814	37·19	39·10	43·74	61·63	61·03	64·93
1815	32·55	50·64	55·09	58·30	69·90	72·40
1816	41·16	40·69	46·00	55·20	60·90	67·36
Average of 10 years.	38·96	45·76	48·46	56·02	65·48	68·82
Year	**7. July**	**8. Aug.**	**9. Sept.**	**10. Oct.**	**11. Nov.**	**12. Dec.**
1807	75·19	74·67	62·13	60·03	42·83	41·25
1808	77·87	72·51	64·06	53·96	50·00	39·35
1809	69·87	69·22	64·23	57·12	44·96	45·42
1810	70·35	71·06	68·03	58·80	49·63	44·32
1811	69·80	67·80	68·00	63·00	51·50	44.48
1812	66·52	64·38	64·70	56·93	46·76	39·22
1813	74·22	72·06	66·23	55·96	47·70	42·19
1814	75·19	71·87	66·10	56·06	46·20	45·38
1815	71.48	72·16	67·66	58·00	44·76	42·03
1816	67·61	66·71	63·10	57·61	44·13	41·83
Average of 10 years.	71·81	70·24	65·42	57·74	46·85	42·55

the Year .... 56·51

LOWER MEAN IN LONDON.

Year.	1. Jan.	2. Feb.	3. Mar.	4. Apr.	5. May.	6. June.
1797	34·64	32·21	34·00	40·76	45·96	49·20
1798	36·09	35·10	37·48	44·10	48·70	55·20
1799	32·06	33·82	34·96	39·06	45·48	50·43
1800	35·71	32·71	34·70	45·63	49·74	51·13
1801	37·13	36·82	40·80	39·83	47·25	52·80
1802	31·16	37·00	36·70	43·33	43·76	51·60
1803	33·09	34·57	38·90	43·53	46·67	52·60
1804	42·13	34·89	38·38	40·86	52·41	55·13
1805	33·48	36·53	38·35	41·40	44·96	50·20
1806	38·90	39·35	38·93	40·30	49·87	54·20
Average of 10 years.	35·44	35·30	37·32	41·88	47·48	52·25

Year	7. July.	8. Aug.	9. Sept.	10. Oct.	11. Nov.	12. Dec.
1797	56·16	53·58	50·36	44·29	38·76	39·06
1798	56·09	58·00	52·53	47·03	37·83	32·38
1799	55·58	53·38	50·20	45·00	41·10	32·29
1800	56·74	57·64	54·13	44·83	40·00	37·06
1801	55·09	57·35	55·60	47·70	38·46	33·93
1892	51·32	58·77	52·00	46·29	39·10	35·83
1803	57·90	56·51	46·86	45·96	39·70	40·19
1804	55·90	56·35	55·00	48·38	43·06	34·45
1805	55·09	58·03	54·86	45·00	37·96	37·51
1806	57·13	57·16	52·96	48·35	45·20	44·80
Average of 10 years.	55·70	56·67	52·45	46·28	40·11	36·75

the Year .... 44·80

LOWER MEAN IN THE COUNTRY.

Year	1. Jan.	2. Feb.	3. Mar.	4. Apr.	5. May	6. June
1807	27·87	31·03	28·93	36·20	48·51	48·50
1808	30·87	30·27	31·38	35·60	49·54	49·73
1809	32·32	39·14	36·64	36·23	46·51	49·30
1810	31·54	34·21	36·87	39·06	40·90	48·46
1811	27·83	36·67	37·29	42·26	51·67	51·33
1812	32·22	37·17	34·58	35·50	46·64	47·36
1813	30·32	37·78	36·25	38·63	47·80	47·76
1814	28·35	27·25	31·90	40·06	40·09	47·06
1815	20·87	38·32	39·35	38·83	47·54	47·83
1816	31·10	26·10	32·48	35·23	41·71	47·73
Average of 10 years.	29·33	33·79	34·57	37·76	46·09	48·50

Year	7. July	8. Aug.	9. Sept.	10. Oct.	11. Nov.	12. Dec.
1807	54·25	55·90	44·03	46·09	32·26	31·54
1808	56·51	54·51	48·76	40·58	38·26	30·58
1809	52·41	53·77	50·70	43·83	34·30	35·41
1810	52·16	52·19	50·10	43·22	39·06	35·38
1811	53·87	50·87	47·66	49·09	39·30	33·03
1812	51·06	51·29	46·20	41·90	36·30	31·80
1813	52·78	50·61	49·16	41·38	34·96	34·67
1814	54·32	52·48	45·26	37·67	33·50	35·03
1815	50·70	51·83	43·10	41·41	31·93	30·48
1816	51·87	51·29	45·33	42·29	30·40	29·96
Average of 10 years.	52·99	52·47	47·03	42·74	35·03	32·79

the Year .... 41·10

MEAN TEMPERATURE of every day in the Year

	First Mo. Jan.	Sec. Mo. Feb.	ThirdMo. Mar.	Four.Mo. April	Fifth Mo. May	Sixth Mo. June
1	37·15	39·65	42·05	44·35	51·00	56·00
2	37·90	40·45	43·75	45·50	52·25	56·70
3	37·70	40·85	43·50	45·40	51·30	59·05
4	38·20	38·17	42·20	46·85	52·55	59·55
5	39·30	38·05	40·37	46·80	53·40	59·45
6	38·20	36·70	40·00	46·87	55·10	59·30
7	37·00	35·40	38·87	47·95	55·30	59·95
8	37·20	35·30	39·30	48·80	54·90	59·90
9	36·30	39 00	39·15	48·05	54·40	61·15
10	35·55	39·00	39·70	48·75	53·50	61·15
11	34·85	37·65	40·70	47·40	53·47	58·70
12	34·00	35·75	41·20	46·12	52·90	58·25
13	36·25	36·65	40·50	45·90	51·60	59·70
14	39·30	35·90	42·75	47·27	51·05	60·35
15	39·00	38·30	42·97	49·52	52·20	59·60
16	38·10	37·55	41·72	49·75	53·45	60·50
17	39·00	38·00	42·60	49·80	54·55	61·10
18	40·20	38·25	42·75	50·15	55·00	61·35
19	41·70	38·05	41·05	50·50	55·50	60·50
20	43·10	40·00	41·27	50·05	55·70	61·80
21	43·60	43·45	41·62	50·55	56·40	59·32
22	42·00	44·92	41·87	49·15	57·45	59·35
23	40·45	44·30	43·65	47·50	56·70	58·50
24	40·00	43·80	45·65	48·85	56·80	60·30
25	37·80	42·37	46·40	50·00	58·80	62·09
26	36·75	41·95	46·15	49·40	60·25	61·10
27	39·60	42·82	46·75	50·05	59·40	61·20
28	38·05	40·90	45·40	49·52	59·20	62·25
29	38·42		45·30	48·65	58·90	62·10
30	37·95		45·20	50·00	56·95	62·20
31	39·80		43·85		55·50	

in London, on an average of 10 Years: 1797—1806.

	Sev. Mo. July	Eight Mo. Aug.	Nin. Mo. Sept.	Ten. Mo. Oct.	Elev. Mo. Nov.	Twel. Mo. Dec.
1	61·90	67·40	61·05	54·10	48·85	42·30
2	63·40	65·80	61·25	55·90	48·80	41·35
3	63·45	66·50	62·35	56·40	45·75	40·30
4	64·55	65·30	62·35	54·90	44·65	38·85
5	63·00	64·85	61·85	53·65	43·35	42·00
6	62·15	65·00	61·95	54·30	44·90	42·80
7	62·55	64·55	61·35	53·95	44·55	39·95
8	64·15	65·05.	60·10	54·70	46·30	40·30
9	64·35	65·60	60·00	54·00	45·15	39·95
10	63·45	65·67	59·60	52·20	44·80	39·35
11	63·55	65·60	59·65	52·45	46·10	39·35
12	63·05	66·35	58·25	50·55	44·60	38·85
13	62·35	64·10	58·90	50·20	44·60	38·60
14	62·60	64·30	60·35	51·05	45·85	38·40
15	61·90	65·00	61·30	51·55	45·70	39·20
16	62·85	64·35	60·62	50·75	44·80	40·40
17	63·70	65·95	61·20	50·00	43·05	39·95
18	63·05	65·45	61·10	52·05	42·40	39·15
19	63·80	65·00	60·70	51·10	41·95	39·35
20	63·90	63·80	60·20	50·00	41·40	40·65
21	62·75	62·55	58·20	50·95	41·55	40·75
22	62·85	62·35	56·80	49·90	41·50	41·35
23	64·45	62·95	57·25	48·45	41·50	40·25
24	63·60	63·05	55·60	48·80	40·90	39·00
25	62·70	62·05	54·75	48·60	41·90	38·70
26	64·25	61·00	55·55	50·30	42·95	39·15
27	64·05	62·10	57·15	48·45	41·90	38·45
28	63·50	64·25	54·75	47·50	42·35	35·50
29	63·95	65·10	56·85	47·10	42·00	38·90
30	65·35	64·15	55·15	48·50	42·00	40·20
31	66·05	62·65		49·15		37·75

MEAN TEMPERATURE of every day in the Year in

	First Mo. Jan.	Sec. Mo. Feb.	Third Mo. Mar.	Four. Mo. April	Fifth Mo. May	Sixth Mo. June
1	36·00	39·75	42·50	44·00	54·50	58·10
2	33·95	40·30	41·85	43·25	52·85	59·00
3	33·50	39·80	40·70	42·35	54·05	57·25
4	34·65	38·50	42·00	42.80	53·00	58·90
5	35·65	40·35	39·00	44·55	53·05	56·00
6	36·05	42·25	40·45	46·80	54·05	55·60
7	34·70	39·35	40·20	46·25	54·10	57·45
8	34·90	39·25	40·80	44·65	55·25	59·15
9	35·95	39·10	40·15	46·30	54·00	57·15
10	36·60	40·85	38·10	47·90	54·25	57·60
11	36·40	42·35	40·50	45·80	56·00	58·80
12	34·90	41·00	40·25	47·40	55·55	58·55
13	34·30	39·55	40·45	47·25	56·65	59·80
14	33·10	38·95	39·05	47·60	55·90	59·00
15	31·10	40·15	38·65	46·80	56·50	57·50
16	33·20	40·25	39·30	46·15	57·15	57·75
17	32·05	37·65	39·95	44·20	58·75	58·00
18	32·05	37·60	40·75	44·30	55·65	59·00
19	32·35	38·70	41·45	46·55	54·65	59·00
20	30·75	38·35	44·35	48·15	55 15	59.15
21	31·10	39·95	45·25	47·00	54·25	59·65
22	30·70	40·30	43·70	48·20	52·30	58·35
23	32·70	38·85	42·65	49·05	54·45	58·75
24	33·20	40·65	40·90	49·10	56 05	58·85
25	32·40	39·95	39·30	49·15	58·25	61·10
26	35·65	39·50	41·75	49·30	58·45	59·20
27	36·05	39·95	43·90	50·35	57·60	59·95
28	35·30	39·97	46·00	50·90	58·60	59·45
29	34·85		44·95	49·40	57·85	61·30
30	35·75		44·15	51·15	58·50	60·00
31	38·90		44·60		60·45	

the Country, on an average of 10 Years: 1807—1816.

	Sev. Mo. July	Eight. Mo Aug.	Nin. Mo. Sept.	Ten. Mo. Oct.	Elev. Mo. Nov.	Twel. Mo. Dec.
1	60·25	62·15	59·05	51·60	47·15	39·90
2	60·85	64·10	59·55	51·60	45·95	39·00
3	57·15	62·00	59·80	53·60	43·05	40·95
4	56·80	62·15	57.50	54·95	41·90	40·95
5	59·65	62·10	58·85	56·60	41·30	39·40
6	61·35	61·75	56·40	54·80	41·90	39·40
7	61·45	61·85	55·55	53·60	41·30	37·70
8	62·00	60·90	55·65	52·90	42·25	36·15
9	63·40	59·30	57·10	51·25	44·30	35·75
10	62·25	61·70	56·55	51·90	42·65	36·45
11	64·60	61·10	57·15	51·20	42·70	37·05
12	65·00	62·35	54·60	49·65	43·10	39·25
13	64·75	61·45	54·90	51·05	41·10	38·55
14	64·00	62·25	56·05	50·65	40·65	38·00
15	63·30	62·25	57·35	49·90	41·50	38·15
16	61·90	60·95	57·45	50·15	41·20	36·95
17	62·65	61·10	56·70	51·20	41·00	39·05
18	62·00	62·90	56·85	50·60	39·25	39·55
19	63·95	60·45	55·05	51·10	38·55	37·45
20	62·60	60·05	56·70	51·55	40·85	35·70
21	61·00	60·75	57·85	50·30	39·00	33·60
22	62·00	62·65	58·60	50·05	37·80	35·40
23	64·05	62·90	54·80	47·55	38·55	37·20
24	63·80	60·55	55·20	48·15	38·70	36·75
25	65·70	61·90	53·80	47·15	40·65	36·45
26	63·10	60·35	55·60	46·20	40·10	37·65
27	62·95	60·60	53·85	46·55	38·10	35·05
28	63·20	58·85	52·00	45·10	36·95	36·70
29	63·65	57·80	53·70	44·95	37·80	37·80
30	61·80	61·75	53·20	45·85	38·90	37·20
31	61·15	60·80		46·10		37·25

MEAN TEMPERATURE of every day in the Year for

	First Mo. Jan.	Sec. Mo. Feb.	ThirdMo. Mar.	Four.Mo. April	Fifth Mo. May	Sixth Mo. June
1	36·57	39·70	42·27	44·17	52·75	57·05
2	35·92	40·37	42·80	44·37	52·55	57·85
3	35·60	40·32	42·10	43·87	52·67	58·15
4	36·42	38·34	42·10	44·82	52·77	59·22
5	37·47	39·20	39·69	45·67	53·22	57·72
6	37·12	39·47	40·22	46·84	54·57	57·45
7	35·85	37·37	39·54	47·10	54·70	58·70
8	36·05	37·27	40·05	46·72	55·07	59·52
9	36·12	39·05	39·65	47·17	54·20	59·15
10	36·07	39·92	38·90	48·32	53·87	59·37
11	35·62	40·00	40·60	46·60	54·74	58·75
12	34·45	38·37	40·72	46·76	54·22	58·40
13	35·27	38·10	40·47	46·57	54·12	59·75
14	36·20	37·42	40·90	47·44	53·47	59·67
15	35·05	39·22	40·81	48·16	54·35	58·55
16	35·65	38·90	40·51	47·95	55·30	59·12
17	35·52	37·82	41·27	47·00	56·65	59·55
18	36·12	37·92	41·75	47·22	55·32	60·17
19	37·02	38·37	41·25	48·52	55·07	59·77
20	36·92	39·17	42·81	49·10	55·42	60·47
21	37·35	41·70	43·44	48·77	55·32	59·49
22	36·35	42·61	42·79	48·67	54·87	58·85
23	36·57	41·57	43·15	48·27	55·57	58·62
24	36·60	42.22	43·27	48·97	56·42	59·57
25	35·10	41·16	42·85	49·57	58·52	61·55
26	36·20	40·72	43·95	49·35	59·35	60·15
27	37·82	41·39	45·32	50·20	58·50	60·57
28	36·67	40·44	45·70	50·21	58·90	60·85
29	36·64		45·12	49·02	58·37	61·70
30	36·85		44·67	50·57	57·72	61·40
31	39·35		44·22		57·97	

London and its environs, on an average of 20 Years: [1797—1816.

	Sev. Mo. July	Eigh. Mo. Aug	Nin. Mo Sept.	Ten. Mo. Oct.	Elev. Mo. Nov.	Twel. Mo. Dec.
1	61·07	64·77	60·05	52·85	48·00	41·10
2	62·12	64·95	60·40	53·75	47·37	40·17
3	60·30	64·25	61·07	55·00	44·40	40·62
4	60·67	63·72	59·92	54·92	43·27	39·90
5	61·32	63·47	60·35	55·12	42·32	40·70
6	61·75	63·37	59·17	54·55	43·40	41·10
7	62·00	63·20	58·45	53·77	42·92	38·82
8	63·07	62·97	57·87	53·80	44·27	38·22
9	63·87	62·45	58·55	52·62	44·72	37·85
10	62·85	63·69	58·07	52·05	43·72	37·90
11	64·07	63·35	58·40	51·82	44·40	38·20
12	64·02	64·35	56·42	50·10	43·85	39·05
13	63·55	62·77	56·90	50·62	42·85	38·57
14	63·30	63·27	58·20	50·85	43·25	38·20
15	62·60	63·62	59·32	50·72	43·60	38·67
16	62·37	62·65	59·04	50·45	43·00	38·67
17	63·17	63·52	58·95	50·60	42·02	39·50
18	62·52	64·17	58·97	51·32	40·82	39·35
19	63·87	62·72	57·87	51·10	40·25	38·40
20	63·25	61·92	58·45	50·77	41·12	38·17
21	61·87	61·65	58·02	50·62	40·27	37·17
22	62·42	62·50	57·70	49·97	39·65	38.37
23	64·25	62·92	56·02	48·00	40·02	38·72
24	63·70	61·80	55·40	48·47	39·80	37·87
25	64·20	61·97	54·27	47·87	41·27	37·57
26	63·67	60·67	55·57	48·25	41·52	38·40
27	63·50	61·35	55·50	47·50	40·00	36·75
28	63·35	61·55	53·37	46·30	39·65	36·10
29	63·80	61·45	55·27	46·02	39·90	38·35
30	63·57	62·95	54·17	47·17	40·45	38·70
31	63·60	61·72		47·62		37·50

Examples of opposite variations of the Mean Temperature in different periods.

Before I dismiss the subject of Temperature, it will be proper to exhibit specimens of the tendency of the average diurnal Temperature to vary, at different periods, in opposite directions.

The upper curve in fig. 7 (the full line) is the diurnal mean carried through the *First month,* on the average from 1797 to 1806: the corresponding Temperature, on the average from 1807 to 1816, is represented by the lower curve. The diurnal mean on each of the above averages for the *Seventh month,* is shown by the two curves in fig. 8. See the same in the Tables, p. 138—141. From the contrast in direction which prevails through the greatest part of these two figures, it appears, that the Mean Temperature is subject to these peculiar variations, both in the hottest and coldest months of the year. I shall revert hereafter to the figures, and treat of the probable cause of the opposition. In the mean time the *dotted curves* may serve to explain a discrepancy, betwixt my own diurnal mean observations and those of the Royal Society, which, not being obvious in the Tables of the latter, was not detected till comparison had been fully made of the respective results.

In the Register of the Royal Society, the *minimum* by Six's Thermometer is that of the nocturnal depression *following* the maximum of the day indicated: in my own it is that of the depression preceding it. In averages relating to the month, or any longer period, this difference induces no error in the comparison: but when, as in the present curves, the mean of each day is to be exhibited, there results a discrepancy, of which it was not proper to leave the reader ignorant. In the dotted curves, therefore, is shown the mean Temperature by the Register of the Royal Society, as it would have appeared, had it been calculated for each day, according to my own method. The change of the one curve for the other, it will be perceived, in no way affects the contrast I have been insisting on.

to face p. 144.

Plate 3.

Fig. 7.

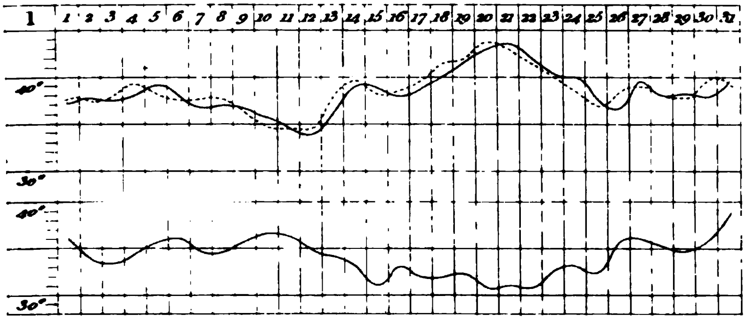
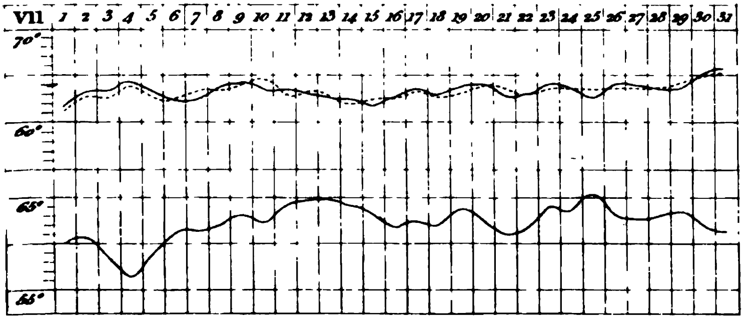


Fig. 8.



OF THE PRESSURE.

Next to the Temperature, the variable *Pressure* of the Atmosphere, as indicated by the *Barometer*, claims the attention of those who are accustomed to the use of philosophical instruments. Indeed, the elegance of its construction, the facility of observing its changes, perhaps also something mysterious and imperfectly understood in its indications, have made this instrument but too successful a rival to the Thermometer: and we are probably deprived by this preference on the part of observers, of many useful results, which the latter, skilfully used might, in different situations, have furnished to science. The Barometer, when we contemplate it as a counterpoise to the weight of the atmosphere, is certainly a curious instrument: its movements, unlike those of the Thermometer, which relate only to surrounding space, bring us intelligence from the very surface of the aerial ocean, many miles above our heads. Here, probably, exist elevations and depressions of prodigious extent; and as the representative in miniature of those tides in a sea without shores, its variations deserve, in point of theory, greater attention than has been hitherto bestowed on them: for the Barometer has been more observed than studied, and our knowledge of the principles on which its changes proceed is as yet little better than empirical. Hence frequent disappointment to those who trust to it as a *weather-glass*—unless indeed it be assisted by attention to natural prognostics, and to the humbler, but not less certain indications of the Thermometer and the Vane. But our present business is, not so much with the theory of its movements, as with their *General results*; in which we shall find matter sufficiently interesting, and allied to the previous facts of this inquiry.

Mean of the Barometer for London.

The mean height of the Barometer as deduced from 124 Lunar periods in this work, beginning Dec. 10, 1806, and ending Dec. 11, 1816, including a space of *ten years*, is .... 29.823 in.

The mean height for the ten years by the Calendar, from 1807 to 1816 inclusive, as deduced from the yearly results in the Philosophical Transactions, is 29.849

and for the ten years preceding 29.882

Average at London on 20 years ending with 1816 .... 29.8655

The Barometer employed at Somerset-house is uniformly stated, during this period, as situated 81 feet above the level of low water spring tides in the Thames. I am not prepared to state with equal precision the different heights (for the most part inferior to this) at which the observations contained in my Tables were made: nor is it of importance, as I do not propose in this instance to incorporate the results of that register with my own, for the purpose of drawing more extensive general inferences. The mean of 29.823 inches is therefore to be considered as the standard, to which I refer my own observations, for the ten years which are now to be more particularly examined.

Yearly Range and Extremes of the Barometer for Ten Years.

The General Table C exhibits the greatest and least elevations of the Barometer in each month, for the ten years from 1807 to 1816, together with the attendant winds. To the maximum heights of each year I have annexed the mark *, and to the minimum †. The reader will perceive that the whole of the yearly *maxima* stand connected with *Northerly* winds, and the whole of the yearly *minima* with *Southerly*. Indeed, this rule holds generally throughout the Table, as to the monthly extremes also; and I need scarcely refer in this place to the fact, so long known and proved, that Northerly winds raise the Barometer, while Southerly ones depress it.

Of the yearly *maxima*, the greater number occur within the first three months of the year, and the rest about the end of it. The yearly *minima*, with a single exception, fall within the last three months. Thus there are six months, of Spring and Summer, in which, with a single exception in ten years, the Barometer visits neither extreme of its yearly variation: while the higher annual extreme is chiefly, the product of Winter, and the lower one of Autumn.

The following Table drawn from the results of Table C will serve for more easy reference.

Year.	Mean of 12 greatest elevations.	Mean of 12 greatest depressions.	Medium of elevations & depress.	Highest observation in the year	Lowest observation in the year	Range for the year.
1807	30·310	29·167	29 738	30 60	28·68	1·92 in.
1808	30·338	29 263	29 800	30·71	28·72	1·99 in.
1809	30·295	29·088	29·691	30·49	28·25	2·24 in.
1810	30·323	29·327	29·825	30 51	28·50	2·01 in.
1811	30·302	29·195	29·748	30·61	28 65	1·96 in.
1812	30·266	29·279	29·772	30·51	28·53	1·98 in.
1813	30·314	29·214	29 764	30 50	28·64	1·86 in.
1814	30·266	29·190	29 728	30·42	28·22	2·20 in.
1815	30·309	29·136	29·722	30·58	28·85	1·73 in.
1816	30·327	29·023	29·675	30·62	28·53	2 09 in.
Averages	30·305	29·188	29·746	30·555	28·557	1 998 in.

The average of the third column, or the *medium* between the average elevations and depressions, is near eight hundredths of an inch below the *mean height for the climate* (or 29.823 in.), the reason of which is, that the depressions occupy a smaller space of time than the elevations; in consequence, a less proportion of them comes into an average founded on daily results.

The *average annual range* for 10 years is very nearly 2 inches; the range varies in different years about ½ an inch.

The *greatest elevation* in 10 years appears to have been 30.71 inches. This took place on the 24th of Second month, Feb. 1808: it was introduced by NE breezes, with hoar frosts at night, and a temperature of 39° in the middle of the day. But this is not quite the higher extreme of the climate: for on the 7th of the same month in 1798, the Barometer rose to 30.89 inches: the elevation being in like manner introduced by a gentle NE wind, with hoar frosts at night, and a temperature of 39° in the middle of the day on which it took place. I observed on this occasion, that the air at Plaistow was filled with a dense mist: but in 1808 I believe it was clear at the time. The coincidence of circumstances in some other points is remarkable.

The *greatest depression* in 10 years occurred in 1814, on the 29th of the First month, Jan. when the Barometer descended to 28.22 in. It is very nearly equalled by a former one, on the 17th of Twelfth month, Dec. 1809, which was 28.25 in. Both were introduced by strong Southerly winds. Having been on each of these occasions at home, and attentive to the phenomena, I must refer the reader to the accounts of them, in the Notes and Results under Table 39, and the Results under Table 90, in my first volume. The depression of 1814, it will be observed, took place at the first remission of the severe cold of that season, by which the Thames was frozen over.

Neither extreme for the year is ever produced very suddenly. In 1798, the Barometer took eight days, to rise from 29.15 to 30.89: in 1814, five days, to fall from 29.88 to 28.22. The great depression of 1809 was in progress for several weeks, before it arrived at the crisis: but of this I shall have occasion to treat hereafter. There is also, as in the case of Temperature, a consistency between the annual extremes: in those years in which the Barometer falls very low, it does not rise so high as in others, and *vice versa:* the same sort of gradation from year to year which appears in the Temperature, is also occasionally found in these results.

Monthly Range and Extremes of the Barometer on an average of Ten years.

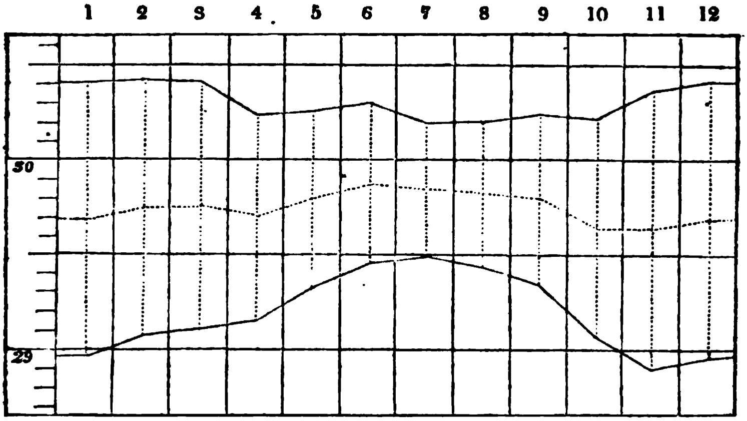
This part of the subject presents gradations almost as regular and striking as those of the Monthly Temperature: to exhibit which it will be necessary to have recourse to curves, and to a second statement in figures, drawn from the General Table C. The present Table consists entirely of results found on taking the columns vertically by the month; as the other did of those found on taking the lines horizontally for the year.

Month.	Average of Maxima.	Average of Minima.	Difference or mean Range.	Greatest elevation in 10 years.	Greatest depression in 10 years.	Difference or full Range.
1. Jan.	30·400	28·971	1·429	30·60	28·22	2·38 in.
2. Feb.	30·419	29·069	1·350	30·71	28·70	2·01 in.
3. Mar.	30·405	29·106	1 299	30·61	28·81	1·80 in.
4. Apr.	30·233	29·154	1·079	30·36	28·74	1·62 in.
5. May	30·251	29·337	0·914	30·42	28·90	1·52 in.
6. June	30·283	29·452	0·831	30·40	29·15	1·25 in.
7. July	30·182	29·491	0·691	30·39	29·40	0 99 in.
8. Aug.	30·193	29·434	0·759	30 26	29·24	1·02 in.
9. Sept.	30·232	29·334	0·898	30·40	28·86	1 54 in.
10. Oct.	30·212	29 056	1·156	30·35	28·53	1·82 in.
11. Nov.	30·357	28·899	1·458	30·62	28 50	2·12 in.
12. Dec.	30·407	28·957	1 450	30·62	28·25	2·37 in.

The upper curve in Fig. 9 shews the manner of variation throughout the year of the average higher extreme, or mean of ten maxima; the lower curve that of the average lower extreme, or mean of ten minima. I have added a medium curve between the two; together with a set of dotted perpendiculars, which express the *mean range* for each month.

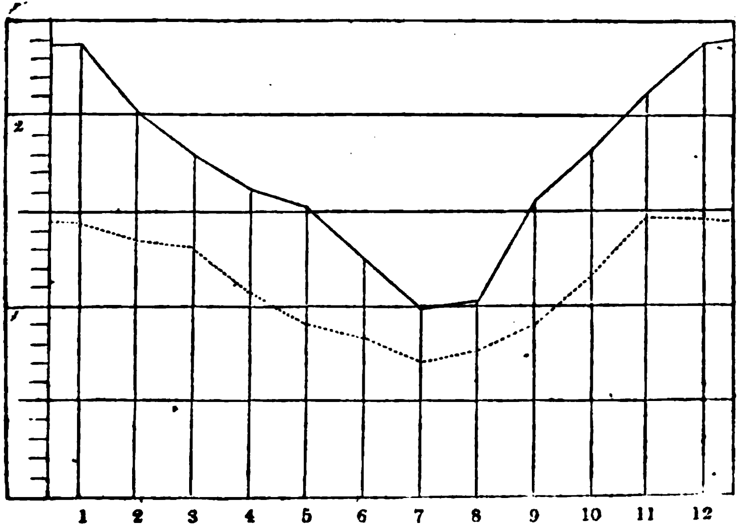
The greatest *elevations* of the Barometer, it appears, take place in the winter months; and during seven months of the year, from the Fourth to the Tenth inclusive, they fall off, to the amount, as the fourth column shews, of a quarter of an inch on the whole.

Fig. 9.



The *depressions* too, are most considerable in the winter half year, being at their full extent in the Eleventh month: from whence they decrease to the Seventh and then increase again; the total difference exceeding half an inch: the progress of the series through the six months of summer forms a regular curve, ascending and descending; the remainder of it an ascending line.

Fig. 10.



In consequence of these movements of the maxima and minima in opposite directions, the monthly range is shortened as the summer comes on, and lengthened again in proportion as that season gives place to winter. Fig. 10 represents this gradation; the full line being the curve of the full monthly range on an average of ten years, the dotted line that of the mean range; the perpendiculars marking the extent of range in each case. It is about an inch on the whole in the middle of summer, and more than 2⅓ inches in the middle of winter. The progress of the mean range through eight months, from the Third to the Eleventh, forms again a regular curve, in descent and ascent; the remainder a descending line.

From the greater tendency of the *depressions* to go off in the summer, the medium curve has its higher points in that season, notwithstanding the lower level of the great *elevations*. In this respect, as will be shewn hereafter, the curve of the *medium* agrees with that of the true *mean*, deduced from all the observations; and each of them proves that on the whole, *the weight of the atmosphere is greater in summer than in winter.*

Remarks on the Scale of the Barometer, and on the use of this instrument as a Weather-glass.

It was not without reason, we see, that the scale of the Barometer for London was fixed in the space of 3 inches, from 28 in. at the lower, to 31 in. at the higher extreme. The same scale will probably serve for every place, situate near the level of the sea, in these islands. But for inland elevated places, the scale should be brought down half an inch, or in some eases an inch, making its lower extreme 27½ or 27 in., while the higher part might be shortened in proportion. For it cannot be doubted that in some of these, the quicksilver would occasionally fall below the bottom of the scale of a well adjusted Barometer; and a false adjustment, by means of the screw at bottom, or purposely effected in the construction, is probably the reason why this defect is not more often perceived.

The terms *Fair*, *Changeable*, *Rain*, &c. at present commonly attached to certain points of the scale, are likewise misplaced, as far as regards London and other places near the sea-level. The true *medium* of elevations and depressions for these, appears to be very near to 29·75 in. This part of the scale therefore, and not 29·50, as at present, should be marked *Changeable*. Half an inch above it, or 30·25, may be designated *Fair*; and the same distance below, or 29·25, *Stormy*. These limits might then be of some real use to the inexperienced observer; especially if his judgment were assisted by some such directions as the following.

Rain is most plentiful and Thunder most frequent, while the quicksilver fluctuates *about the changeable point*, or between that and the stormy one; for the mean or average of these short movements being generally lower in winter, and higher in summer, an allowance of one or two tenths may be made either way, according to the season.

In proportion as the quicksilver advances from the changeable towards the *Fair* point, the probability of fair weather increases: at or beyond that point, it is extreme: and it decreases as the quicksilver recedes again.

In proportion as the quicksilver falls from the changeable towards the *Stormy* point, the probability of a storm of wind increases: at or below that point, it is extreme: and the rising again of the quicksilver is not to be regarded as indicative of more settled weather, until it has again passed the changeable point.

Sudden considerable changes, in either direction, are commonly followed by fair or foul weather equally transient: while a steady rise from day to day, of a tenth or so in the twenty-four hours, or a prolonged fall in the same proportion, (either of them passing the changeable point,) may generally be trusted as prognostics of continued rain or fair weather.

It is obvious, that in situations exceeding 200 feet in elevation above the sea level, the changeable point may very well remain at 29·50; and that in those exceeding 500, it should be lowered at least to 29·25, the others in each case being placed at proportionate distances. Indeed, to render the Barometer as useful as it is capable of being, in different respects, every separate instrument should be adjusted by the maker to some good common standard; and the *mean point* fixed with an attention to the known elevation of the country, similar to that which is exercised with regard to the latitude in constructing a dial.

So much as to this instrument when employed, by itself, as a Weather-glass; but it will always be found most useful in this respect, when observed in conjunction with the wind and temperature, and with the natural prognostics daily presented to our notice on the face of the sky.

OF THE WINDS.

The direction in which the wind at any time passes over us is far from constituting the whole of what we would wish to know on this subject. The length and breadth of the stream, its mean depth and velocity; the part of it in which we are at any time situate; the place where it took its origin, and that in which it wheels about to assume a new direction, or having spent its force, becomes stagnant: all these are objects of reasonable curiosity, and which might perhaps be ascertained by distant and well-concerted observations. At present, we are able to infer only now and then a consequence, from the comparison of results found at home with those deducible from other registers, or from the reports obtained from the coasts by mercantile men; who are sometimes deeply interested in the cessation or continuance of particular winds.

The *Yearly* and *Monthly* results of the observations contained in the first volume of this work, will constitute the matter of the present section. In digesting these, I have assumed *five* classes for the winds. The observations would have furnished *nine*, but with limits less entitled to confidence than those which we obtain by embracing a greater number of points, and thus giving a chance of mutual compensation to some inaccuracies, inseparable from the smaller divisions.

The 1st Class extends from *North* to East, not including the latter point; that is, it consists of my N and NE observations: and so of the rest.

The 2d Class extends from *East* to South, not including the latter.

The 3d Class from *South* to West, the latter not included.

The 4th Class from *West* to North, (not included,) completing the compass.

The 5th Class comprehends the *variable* observations.

Yearly proportions of the several Winds in Ten years.

The following Table contains a statement of these on the plan which I have described, the few days wanting in my Tables being supplied, for the purpose of calculation, from the Register of the Royal Society.

Year	N—E	E—S	S—W	W—N	Var.
1807	69	34	113	114	35
1808	82	38	108	103	35
1809	68	50	123	91	33
1810	81	72	78	83	51
1811	58	59	119	93	36
1812	82	66	93	91	34
1813	76	53	92	124	20
1814	96	65	91	96	17
1815	68	36	121	107	33
1816	64	66	106	102	30
Averages	74,4	53,9	104,4	100,4	32,4

This Table shews that, with some variation in different years, there obtains a proportion between the different classes of winds in our climate, which may be thus stated.

1. A wind from the North, or between that and East, prevails on an average 74 out of 365 days; the greatest amount of its number being 96, the least 58 days.

2. A wind from East to South, 54 days, varying in different years from 72 to 34 days.

3. A wind from South to West, 104 days, varying from 123 to 78 days.

4. A wind from West to North, 100 days, varying from 124 to 83 days.

5. Variable winds obtain about 33 days, or the remainder of the year, their number being from 51 to 17 days,

The last mentioned division, from the arbitrary manner of noting, is probably the least exact in its limits: there being undoubtedly many days on which the observation might have been carried to one of the four classes, as *prevalent*; and others, on which the term *variable* might have been applied, in preference to the denomination set down. Yet amidst this uncertainty, it is worthy of remark that in *seven* out of the ten years its proportion varies only from 30 to 36, which would induce the conclusion that, were the observations uniformly attended to in this respect, the days on which the wind changes with some force *to an opposite point in the course of the day,* would be found between those limits.

If we now make of the whole two great divisions, towards East and West, allotting the variable to each in due proportion, we shall have

Easterly winds . . .	140
Westerly	225
	365

If towards North and South, then,

Northerly winds . .	192
Southerly	173
	365

Thus a Westerly direction is found to preponderate by about a *third* over the Easterly; and a Northerly direction by about a *ninth* over the Southerly, in the winds of these ten years.

I suppose that a careful revision of the observations, with the aid which might be got from other registers, would introduce some corrections, but probably not any alterations of moment, into these averages. A different series of years in the same district of the island, or the same series in a different district, might also give some variation in the results. The reader is therefore to be on his guard against applying them *generally,* at least for the present. I have no comparative results to introduce on this occasion.

Monthly proportions of the different Winds for Ten years.

The following Table exhibits these in days and decimal parts, the classes being as before, and the term from 1807 to 1816.

Month	N—E	E—S	S—W	W—N	Var.
1. Jan.	6,8	5,3	7,0	9,1	2,8
2. Feb.	3,2	4,0	11,7	7,4	1,7
3. Mar.	9,8	5,4	6,6	6,5	2,7
4. Apr.	8,3	5,6	6,0	6,4	3,7
5. May	5,9	6,5	9,0	5,6	4,0
6. June	7,1	3,0	7,2	9,1	3,6
7. July	4,5	2,5	9,5	11,5	3,0
8. Aug.	3,5	2,9	10,2	12,9	1,5
9. Sept.	6,4	6,0	8,0	7,4	2,2
10. Oct.	5,2	5,0	10,5	7,4	2,9
11. Nov.	7,8	3,1	8,8	8,4	1,9
12. Dec.	5,0	4,6	9,9	9,7	1,8
Averages	6,00	4,50	8,70	8,45	2,65

In the *First Month,* which may be regarded as the middle of winter, we have little more than a mean proportion of N—E winds: yet the *Northerly,* taken together, preponderate by a *fourth* of their amount over the Southerly winds.

In the *Second Month,* the proportions of Northerly and Southerly are reversed, the latter exceeding the former by a *third:* and this principally through the falling off of the N—E to one half, and the increase of the S—W to their highest proportion for the year.

In the *Third Month,* the N—E are in greater proportion than in any other part of the year, exceeding their own average by more than a third.

In the *Fourth Month,* the N—E winds abate somewhat of their excess, continuing still in very high proportion. This and the preceding month exhibit about the same total preponderance of Northerly winds, as the First month: and in both, the E—S class being above its average, the general Easterly direction prevails over the Westerly.

In the *Fifth Month,* the Southerly winds resume the like superiority as in the Second. The E—S class is at its maximum. The N—E having decreased for two months, is now below its average; and the W—N which has decreased by an uninterrupted gradation from the First month, is at its *minimum* proportion: the *variable* winds are at their highest amount.

Sixth Month: a preponderance of *Northerly* winds by more than a *third;* chiefly from the return of the W—N class.

Seventh Month. In this month, the class of W—N decidedly prevails over the rest: the S—W is also in high proportion; the N—E very low, and the E—S at its *minimum,* having gone off for two months.

The *Eighth Month* exhibits the class N—E at its *minimum*, and that of E—S but little removed from it: while the W—N is at its *maximum*, having increased for three months, and the S—W in high proportion, having increased for two months. This month has the least proportion of variable winds.

Ninth Month. We have here almost a balance between the Northerly and Southerly winds. In other respects, the class E—S, (which we must remember comprehends the former *point* and excludes the latter), takes a little from the rest, and is but little short of its highest amount.

In the *Tenth Month,* the winds on the North and South sides of East are very nearly equal: but the S—W class predominates over the whole, and with the aid of the E—S, exceeds the Northerly winds by a fourth of the sum of the latter.

Eleventh Month. Northerly winds now predominate by a fourth of their amount; chiefly from the increase of the class N—E; and the proportion of *variable* is very small.

Twelfth Month. The classes in this month do not depart very far from their respective averages. We have again the Northerly and Southerly almost exactly balanced; while the Westerly are nearly double the sum of the Easterly.

The monthly proportions of the several classes *in each year*, will be found in the General Table D, over the Monthly amounts of rain. I shall have occasion to resume the subject more than once, in the course of this volume, with a view to the connexion of particular winds with the variations of the Barometer, or with dry and wet seasons; and their relation to the Lunar periods, the Solstices, and the Equinoxes; but it is proper first to present the reader with the immediate Results of the Register through its several divisions.

The subject of the Winds is one of so great interest to the community, that nothing but the apparent want of system, in their variations in these latitudes, can have prevented men of science from studying them with greater attention, and bringing out some useful results. I believe the experience of our navigators, in this as in some other respects, outruns science, and furnishes already some general axioms, respecting the Winds commonly met with at particular seasons in our climate. It would be rendering no small service to those who have frequent occasion to quit our coast, or to enter our harbours from the seas, could the whole of the information already within our reach on this subject be digested in a systematic form for their use: more especially, as it might enable them to anticipate with greater certainty the recurrence of those long periods of NE and SW winds, not improperly termed the Monsoons of our climate; by which our communication with the Atlantic is at times impeded, at others facilitated, for whole months together.

OF THE EVAPORATION.

Experiments made with a view to ascertain the natural Evaporation differ in their results according to the manner in which the water is exposed. If it be fully acted upon by the sun and wind, in a vessel of small capacity, the quantity evaporated appears in excess: if greatly sheltered from both, the contrary. In the whole of the experiments detailed in the First volume, the water was placed under cover; just sufficiently sheltered to prevent the entrance of driving rains, and consequently the direct impulse of the sun's rays when much elevated above the horizon. During the first three years, the results were entered almost daily in the Tables; afterwards, at intervals varying from two to ten days, or weekly. But in the year 1815, having substituted for these results the daily indications of the Hygrometer, I ceased to attend so constantly to the Evaporation.

Mean Evaporation in the Year.

In the years 1807, 1808, and 1809, the guage being elevated about 43 feet from the ground, exposed to the SE, and subject to the free action of the wind in most directions, the annual average result was 37.85 inches.

From 1810 to 1812 inclusive, the instrument being in various situations, for the most part lower and less exposed, the annual average was 33.37 inches.

Lastly, in the space from 1813 to 1815 inclusive, the guage being upon or near the ground, the annual results averaged only 20.28 inches.

Having resumed in 1818 the observations conducted on the ground, I obtained in eleven months a total of about 23 inches: to which if we add a mean result for the month omitted we shall have for this year (so remarkable for its hot and dry summer) an evaporation of nearly *twenty-five* inches: a quantity not disproportionate to the average of the three years last recited, considering that the calmness of the air during this summer was as remarkable as its temperature.

The Evaporation obtained in 1818 very nearly equals the annual average depth of rain about London. In years with a cool or wet summer it falls below this standard: but on account of the acceleration to which this process is liable by the effect of strong winds, it is difficult to make an accurate comparison in two seasons of unequal temperature. Nor is it likely that with a little water, exposed in a vessel of a few inches diameter, we should obtain a complete solution of this problem, as it is set before us on the great scale of nature. The first or second of the three averages above stated may perhaps approximate to the Evaporation from our rivers, the surface of which is always in motion by the winds and currents: the third may be considered as representing that of small canals, ponds, and reservoirs.

Evaporation in the different Seasons of the Year.

The monthly results which form the basis of this section are digested in the general Table E, at the end of the volume. The series (of eight years and a half) is an interrupted one, but it presents at least seven results for constructing each of the monthly averages at the foot of the Table. These averages run, as might have been expected, with a general, but not uniform, relation to the Monthly Mean Temperature. The cause of Evaporation is the heat contained in the fluid, and it has been long since shewn that, other things being equal, the effect is in relative proportion to the temperature. But in nature it is always modified by the quantity of vapour already subsisting in the atmosphere, considered relatively to the temperature of the latter. For instance, in the Third month 1807, the mean temperature of which was 42°, the Evaporation amounted to 2·66 in.: but in the Tenth month of the same year, with a temperature somewhat exceeding 42°, and more wind, it was only 1·86 in.: the difference being plainly caused by the season.

If we take the Twelfth, First, and Second months as the Winter, and the remaining months in similar classes of three, for the other seasons, and divide the average Evaporation among the four classes, it will stand thus;

	Evaporation.	Mean Temp.
Winter	3·587	37·20
Spring	8·856	48·06
Summer	11·580	60·80
Autumn	6·444	49·13

I have added the mean Temperature for each season as thus divided, the total of degrees of mean Temperature being 195·19, and that of mean Evaporation 30·467 for the year.

Then 195·19 : 30·467 : : 37·20 : 5·806
195·19 : 30·467 : : 48·06 : 7·501
195·19 : 30·467 : : 60·80 : 9·490
195·19 : 30·467 : : 49·13 : 7·668

The four results thus brought out being the quantities which ought to have been raised in vapour in each season, had the effect been in strict proportion to the Temperature, it follows, that in the three months here taken as *Spring* the Evaporation is *augmented* by about a sixth part, and in those taken as *Summer* above one fourth part, in consequence of the *dryness* of the air in these seasons: while in the three months taken as *Autumn* it is *lessened* by more than a sixth, and in those taken as *Winter* by considerably more than a third, in consequence of the *dampness* of the air.

To examine more particularly the monthly results—we see that, as the Temperature advances in the fore part of the year, the Evaporation on the whole increases steadily; but in particular years it receives a check in some part of the spring, which is afterwards made up by a sudden increase. The reason of this is sometimes obvious in the variations of Temperature; as in the year 1809, where I have annexed the mean Temperatures to the results. The rate is likewise occasionally kept down in this part of the year (as in the latter months,) by frosty weather. The very great increase in a fine spring may possibly be due, in part, to the electric-state of the air in such seasons. For although electricity, in the low degree in which it is applied by nature at the Earth's surface, may not sensibly promote the actual emission of vapour from water, it may tend greatly to increase the retentive power of the air, by rendering the particles of the mixture of gases and water in a higher degree mutually repulsive, or in other words, by keeping up the *elasticity* of the atmosphere.

I have attributed an occasional low rate of Evaporation in Spring to the state of the Temperature.

Without destroying this position, we may however invert the term, and say that it is then even colder *because of the evaporation.* It cannot be doubted that the *sharpness* of our NE breezes in Spring is in great measure the result of their excessive dryness, relatively to the Temperature which prevails: in consequence of which they abstract the heat from the animal system by means of the moisture on the skin, which they convert into vapour with peculiar rapidity.

In the latter part of Spring the *guage* sometimes indicates an abundant supply of vapour, when in fact very little is poured into the atmosphere from the Earth; the surface, and even some considerable depth under it, being already dried by the sun and wind. It is then that we perceive the effects of the natural irrigation, carried on by means of the vapour diffused in the day time from canals, rivers, &c. and condensed by night in copious dews, which descend on the neighbouring herbage. Should the season afterwards prove showery, a great quantity of the first water that falls is vapourised by the heated Earth, with a rapidity of which, again, the *guage* gives no proper indication. This vapour may even continue to be thrown up, after the air has begun to approach towards saturation, and thus contribute to the formation of the next rain. And the water may be thus driven from the Earth to the clouds, and returned again in rain, until the surface, being cooled down, is prepared for desiccation under the solar rays by a drier current. The sudden change from a dry to an extremely humid state of the air, immediately after our Spring and Summer showers, is often sufficiently obvious to be detected by the most superficial observer: it is generally due to this sudden and copious production of vapour at the surface. The Spring and Summer are our most variable seasons in point of hygroscopic dryness.

In the Autumn, or rather at the approach of Winter, the rate of the production of vapour declines with great rapidity. The commencement of a saturated state of the air, while as yet precipitation has not generally commenced, gives to our fine autumnal weather a delicious *softness,* the reverse and the compensation of those keen blasts which so often attend the vernal season.

But this state does not continue long. On the approach of the first frost—indeed during a great part of our ordinary winters, the earth and waters retaining a temperature somewhat above that of the air, continue by the force of this inherent warmth to emit vapour. This is continually undergoing decomposition, and it fills the air with a *mist,* which, when by no means dense enough to constitute what we call *fog,* would yet appear to an observer stationed above its limits, as a white veil thrown over the whole face of the country: thicker indeed in the valleys and along the course of the rivers, but nowhere in our district surmounted by the land.

Evaporation under different circumstances of Wind, Temperature, &c.

There are few *days* in the whole year in which some vapour is not raised from the guage: but the process is apparently suspended while *dew* falls by night. A state of the air analogous to this appears to be the cause of its complete interruption by day: of which the reader will find some instances in the Tables, chiefly in the vicinity of the Winter solstice, and at the approach of frost.

It is not always suspended during *rain*, as I have ascertained by direct experiment. The rate is however usually much less on those days in which rain falls, and it is liable to a rapid increase immediately afterwards.

Sometimes, an excess in the rate is found to *precede* rain, whether from the agitation of the air, or the effects of electricity, or from both causes, I have not attempted to determine.

The calm which attends a change of wind sensibly lowers the rate: which also decreases, as might be expected, upon the going off of a wind which has blown steadily for some days.

A moist current of air flowing in upon us will sometimes check the Evaporation, although rain be not produced from it.

Examples of the gradual increase of the rate of Evaporation, in consequence of an elevation of the daily Temperature, and its decrease by the contrary, as likewise of the variations to which it is subject in windy weather, are so numerous in the Tables that it is needless to instance them.

Greatest and least Monthly and Daily Evaporation.

The greatest Evaporation in a month *by the higher guage*, was about 6 inches: in this case a number of favourable circumstances appeared to concur: a high Spring Temperature succeeding to protracted cold; dry winds and an abundant electricity.

The smallest monthly results are found at the approach and during the continuance of the great frost of 1813-14. And here we have a striking example of the retarding effect of a moist air on the process. In the last month of 1813, with great *fogs* prevailing, the mean Temperature being 38° 43, the Evaporation was 0·21 in. (in all probability the lowest amount in ten years,) but in the first three months of 1814, the frost having set in with rigour, and cleared the air, we have a gradation of increasing results thus, 0·25, 0·36, 0·83 in. with the mean Temperatures 26° 71, 33° 17, and 37° 82, all inferior to the former, and the first of them almost 12° below it: which difference in the effect is plainly due to the extreme dryness of the currents prevailing in the latter period.

Indeed, the most intense *cold* is insufficient of itself to put a stop to the formation of vapour. Ice evaporates freely during a clear frosty night; as I have repeatedly convinced myself by direct experiment: see Tables 28, 90, 95, of the first volume. In the former of these experiments, a circular area, five inches in diameter, lost 150 grains between sunset and sunrise. This is at the rate of more than 8000 Troy pounds of ice, or near 1000 gallons of water, from an acre of surface, in that time. The absorption of heat, necessary to the composition of so much vapour within a small space of the atmosphere, must be prodigious. In one instance of this kind, I found the depression of Temperature to exceed 10 degrees; the Thermometer on the snow being at 6° 5, while that at five feet elevation was at 17°. Some part of this cold however, might be ascribed to the radiation from the surface of the snow.

With these facts before us, we need not wonder to hear that a moderate fall of snow is sometimes entirely taken up again, during a succeeding Northerly gale, without the least sign of liquefaction on the surface. In deeper snows, the surface after a while becomes curiously grooved, scooped, and channelled, from the same cause: which effect is most conspicuous around the trunks of trees, and near the interstices of paling, —in short wherever the stream of air acquires force in a particular direction. A little observation will satisfy any one that the snow is not removed, on these occasions, merely by being driven before the wind.

Consistently with these facts, a sensible change in the air to a dry state, after damp foggy weather in winter, may be always safely placed among the indications of approaching frost.

To return to some considerations connected with the higher extreme of Temperature—a rapid decrease of the daily Evaporation in hot weather might furnish a prognostic of approaching thunder and rain, were it needful to add to those we possess already. The greatest Evaporation in one day (a single instance excepted) which I have ever seen, occurred on the 17th of the Fifth month, May, 1809. On that day the amount was 0·39, on the following day 0·28, on the next 0·14 inches: the corresponding mean Temperatures being 67°, 70° 5, and 64°, and consequently furnishing, in respect of heat, no adequate cause for the decrease. But in the evening of the 19th occurred that tremendous storm of hail, rain, and thunder, which I have particularly described under Table 32 of the first volume: and I cannot help supposing that, on this occasion, the local influence of heat, aided by an electric charge in the air, had suddenly raised, as it were, a mound of vapour into those elevated regions, which it rarely visits in these latitudes, and where it is subject, from the contiguity of an intensely cold medium, to complete an extensive decomposition; in which seems to lie the true cause of the prodigious developement of electricity manifested on those occasions. In the same Table, the reader will find a decrease of the daily Evaporation in this ratio, 0·33, 0·26, 0·19, followed by a tempest of wind, and a week's wet weather: but in this case the Barometer, Temperature, and Sky, furnished concurrent indications.

The going off of the excessive heat in the Seventh month 1808, of which I have already treated, p. 110, &c., was attended at Plaistow (although the reaction in the atmosphere took place about Gloucester) with the following rapid decrease in the daily rate of Evaporation. The hottest day being 0·35, the four following were 0·31, 0·27, 0·20, 0·16 inches: and this without more than a few drops of rain in our own immediate neighbourhood.

OF THE MOISTURE BY THE HYGROMETER.

While the Evaporation Guage indicates the rate of the production of vapour from surfaces capable of affording it to the air, the Hygrometer informs us of the state of the latter as approaching more or less towards a relative maximum of moisture, the existence of which, whether in the higher or the lower atmosphere, is commonly followed by rain.

At elevations of a few feet, the index of the hygrometer is usually found at sunrise on the moist side of the mean for the season. As the sun advances, in a fine morning, it recedes towards the dry side, sometimes with considerable rapidity, passing through twenty degrees of the scale by noon. In the evening, if not earlier, it returns again towards moisture. To obtain a true *mean* of variations so considerable, it would be needful to take a number of observations at equal intervals through the twenty-four hours, and average them. But I am not aware that any observer has yet gone so far as to obtain the extremes indicated in that period, in order to record a daily *medium*. In fact the present observations have the same disadvantage as would attend those on Temperature, were the Thermometer inspected but once in the day at a fixed hour. The time which mere convenience induced me to adopt is nine in the morning. About the Equinoxes, this hour is a medium between sunrise and noon, and consequently a very fit time to obtain a mean result. But in winter it approaches too near to sunrise, and in summer recedes too far from it. Imperfect as my results are, on this and other accounts, they are yet too valuable to be passed over, and I shall here give a summary of them with some remarks.

Monthly mean of De Luc's Hygrometer for four years, from daily observations made at 9 in the morning.

	1815	1816	1817	1818	1819	Averages
1. Jan.		81	80	78	81	80
2. Feb.		78	67	81	75	75
3. Mar.		67	64	65	71	67
4. April		59	52	61	69	60
5. May		†57	52	†57	64	57
6. June		†49	47	†47	66	52
7. July			47	45	63	52
8. Aug.	†50		52	†47	59	52
9. Sept.	†61	64	58	†66	71	64
10. Oct.	73	78	†59	73		71
11. Nov.	79	84	†76	81		80
12. Dec.	79	83	78	80		80

The results marked † are the mean of a deficient number of daily observations, varying from thirteen to twenty-five days in the month.

The *general mean* of these observations is 66: and the state of moisture about the Equinoxes, it will be observed, approaches near to the mean, the average of the Third month being one degree moister, and that of the Ninth two degrees drier.

The extreme monthly averages are 80 for Winter, and 52 for Summer, which points are equidistant from the general mean. In the Spring and Autumn, the averages exhibit a gradation from each of these points to the other. It is obvious that had the observations been made always at noon, the medium and extremes would have been respectively, and perhaps proportionately, nearer to dryness: had they been made always at an hour equidistant between sunrise and noon, the two extremes would have approximated nearer to the medium. As it is, they mark strongly the character of the respective seasons of our climate in point of moisture or dryness; and those of our medical practitioners who at present attend to the Thermometer, as an assistant to their judgment in anticipating the prevailing diseases of the season, will perhaps be able, with the help of some such standard as this Table, to avail themselves of the Hygrometer also, for the like laudable purpose.

Connexion of the movements of the Hygrometer with Evaporation and Rain.

In general, a comparative degree of dryness by the Hygrometer is connected with Evaporation and fair weather; and of moisture, with precipitation and rain; regard being had, in both cases, to the *mean* of the season. During the Lunar period, commencing with the 8th of the Fourth month 1817 (Tab. 130), there fell only 0.28 in. of rain: the Hygrometer at nine a. m. was never beyond 63, and once at 34, the mean of the period 49. In the next Lunar period, there fell 3.18 inches: during which the Hygrometer was once at 80, and the mean of the period was 54.

But there are exceptions to be noticed here. In Summer, when precipitation is actually going on above, and thunder-clouds are already formed, the air below may continue, from the intense heat and the arid state of the soil, hygroscopically dry. An instance of this occurs presently after the above, in Tab. 132, Sixth month 24, Hygrometer at nine, 47, (the mean of the period,) " Morning cloudy, then fine: in the evening, heavy rain, with hail, thunder and lightning: Hygrometer before the storm, 36." Next morning at nine it was 61, the rain having afforded vapour: but dry indications again came on, followed by other thunder-storms, to the close of the period, which afforded 2.81 inches of rain.

In Winter, on the contrary, the air is sometimes very moist for a considerable time, without rain: chiefly during the prevalence of foggy days and frosty nights, with a high Barometer: for an instance of which see a space of more than two weeks, following the Winter Solstice, 1818, (Tab. 151). In clear sunny days of frost, however severe, it is otherwise: the Hygrometer indicated several times a dryness of 46 to 50 in the middle of the day, during the intense cold in the Second month 1816. See Tab. 115, which also presents some examples of the moist extreme, followed by snow. In Tables 124, 125, 126, (in the Autumn and Winter of 1816) will be found a number of examples of hibernal moisture, some with and others without the accompaniment of rain. For an example of Summer moisture brought on by the fall of rain, it may suffice to point out Tab. 145, Seventh month 12; where the Hygrometer, having been for several mornings at 46—42, was brought at once by this cause to 70.

A rapid movement of the index towards dry in the morning seems to indicate a fair day, notwithstanding unfavourable signs in other respects. See Tab. 116, Third month 16: also Tab. 110, Eighth month 29, consulting the Notes. But extreme and unusual dryness should be suspected: see the same Table, under Seventh month 14, when a kind of *Harmattan* seems to have been blowing, and the index receded to 22, (the driest point at which I have seen it) yet rain followed in about 48 hours, though a very dry time before, and for some days after.

On the other hand, if the index, when found on the moist side, in the morning after a fair day, continue stationary, or advance to a higher number, rain is to be expected; and this is perhaps among the most certain indications of such a change. See the same Table under Ninth month 24, 25, and consult the fore part of the following Table. See also Tab. 147, Eighth month 27, and Ninth month 1, 4, 15, with the Notes. A change towards dryness *during rain or snow* is favourable, at whatever time it occurs. See Tab. 107, Sixth month 14, the Note; and 126, Eleventh month 10, with the Note.

But the most valuable prognostics are afforded by a progress *from day to day,* towards the moist extreme of the season. Numerous instances of this gradation occur in the course of the Tables: and it is observable, that a retrograde movement towards dryness often takes place during the wet or showery weather, which the preceding advance towards the moist extreme had prepared us to expect. It will suffice to bring the following cases in proof. Tab. 137, Eleventh month 27, to 138, Twelfth month 19; and Tab. 140, Second month 13, to the end.

Such are the results of the few observations which I have incidentally made on the movements of this instrument, in connexion with other indications: and they tend to shew that a regular attention to it in this way would reward the pains of the observer. It would be necessary to complete success, to ascertain the mean proportion of the scale through which the index *recedes,* in a given time after sunrise in each season; by comparing the daily quantity with which, a judgment might often be formed as to the proximity of rain. The more palpable sign of this, given by the advance towards moisture in the forenoon, would then likewise be frequently found useful.

OF THE DEW- OR VAPOUR-POINT.

I had given so little practical attention to this part of the subject of Hygrometry, that it would have been suffered to pass unnoticed here, but for the appearance of a new instrument, adapted to the more ready discovery of the vapour-point; and which has come under my notice only since the last section was finished at press.

The introduction of this process into Meteorology is due, in common with many other original ideas and operations, to my friend John Dalton. It consists essentially in ascertaining, by means of a cold body, the temperature at which the vapour diffused in the atmosphere will begin to be decomposed and to deposit its water. The familiar fact of the dew which, in certain seasons, immediately forms on the outside of a glass vessel, newly filled with water from a deep well, may serve to illustrate the process: the intention is, to discover the precise temperature at which a body will begin thus to elicit water from the air; and by comparing this with the temperature of the air, to judge of its approach towards saturation: it being manifest, from our knowledge of the superior attraction of the permanent gases for heat, that the moment the air itself shall arrive at the temperature indicated by the cold body, it will perform the same office—it will rob the vapour diffused in it of a portion of its constituent heat, and separate the water in *dew, mist,* or *rain.*

Only three experiments of this kind are recorded in my observations in the First volume. In the first, Tab. 1, I found the dew-point but one degree below the temperature of the air at noon. On that day there was no sensible evaporation by the guage, and the rains, which had prevailed some time, continued for several days after. On the second occasion, Tab. 67, I found it at 2h. 30m. p.m. within 3° of the temperature of the air. "In an hour afterwards, it began to rain steadily, and there fell more than half an inch in depth." The third time, Tab. 83, "the air was so loaded with vapour at 9 p.m. as to deposit water on a glass vessel cooled to 58°, the lowest temperature of the following night being 53°. At this this time it began to rain heavily, ceasing at 10, with thunder and lightning still in the North." In effect, during this and the four following days, there fell above 2 inches of rain.

The time and trouble required to perform the operation on purpose (for an accidental deposition on a glass has sometimes suggested the comparison of the temperatures) have prevented frequent experiments on my part. It is therefore with some satisfaction that I notice the introduction of *Daniell's Hygrometer*, of the construction and uses of which an ample account is given in the Quarterly Journal of the Royal Institution, No. 16, together with a Meteorological Journal of four months, containing its indications, by the inventor.

In this instrument, the design of which appears to have been taken from the model of Leslie's Hygrometer and Wollaston's Cryophorus, the requisite degree of cold is produced at all times, with ease and certainty, by means of the evaporation of a few grains of ether. The ether being dropped on the surface of a hollow sphere of glass, covered with muslin, and full of the vapour of ether, an immediate condensation of the latter generates a vacuum within it: into this a second evaporation of ether instantly takes place from a second naked bulb partly filled with that liquid, and connected with the former by a tube. The cold thus produced in the second bulb, causes in a short time a visible deposition of dew from the air on its surface: the temperature at which this effect begins, is indicated by a small included thermometer; and a second thermometer, for the temperature of the atmosphere at the moment, is attached to the pillar which supports the bulbs and tube.

It is obvious that by such an instrument greater facility is afforded to the Meteorologist, of satisfying himself respecting the state of the vapour constantly diffused in the atmosphere, and of drawing from this, *in conjunction with other evidence,* a more certain prognostic, in critical seasons, of wet and dry weather. It is not likely, any more than the Barometer, always to answer this purpose when used *alone,* there being evidently other conditions necessary to the production of rain at a given station, besides the present saturation of the air immediately incumbent on it.

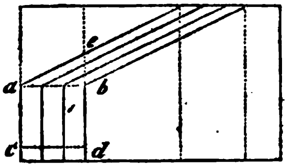
The constant, though minute, expenditure of ether for the experiment may prove to some observers an objection to its use. This may be in part obviated by using a bottle fitted with a tube ending in a capillary opening, and closed in the middle, or near the fine part of its bore, with a stop-cock, which would prevent any unnecessary waste of this volatile fluid; as the heat of the hand would suffice to expel a sufficient quantity upon the ball. It is also possible that some future improvement of the instrmment may enable us to produce 20° of cold, which seems to be all that is wanted in the driest season, without the waste of any material at all. To those who may be occasionally engaged in experiments to find the force of vapour and quantity of moisture present in different seasons and places, and at different elevations in the atmosphere, I have no doubt that this elegant little instrument, which is portable (inclosed in a mahogany box) in the pocket, will be a valuable acquisition.

OF THE RAIN.

The position or elevation of the guage affects the product nearly as much, in the case of Rain, as in that of Evaporation, but in a different way. The Evaporation is increased, as has been shewn, by elevating the guage, but the product of Rain in this case is usually diminished: insomuch that when the guage is transferred from the ground to the house-top, the average falls off by about a fourth part.

I have treated this subject under Table 64 of my First volume; where are detailed the results of experiments made during twenty successive days of wet weather, in the autumn of 1811, wirh a view especially to discover a rule for correcting former results, as also to ascertain the circumstances under which these differences take place. I have since seen no sufficient cause to abandon the conclusion I then came to; that, when rain takes place with a turbid atmosphere, a considerable and variable proportion of the water is actually separated from the vaporous medium, at a height not exceeding 50 feet (or that at which my upper guage was fixed, which was 43 feet) and that this portion, consequently *must* be deficient in the upper guage. But in showers from an elevated region, falling through an air which is not itself undergoing decomposition, the products ought to be (as is the case in some instances) alike in both guages.

In the reasoning connected with those experiments, I did not advert to a possible constant effect of the wind, in lessening the product of the guage in this more exposed situation; but contented myself with proving by experiment "that rain may be drifted as well as snow;" or that a portion of the general receiving surface may be robbed of a part of its rain, by deflected currents in the moving atmosphere, which transfer it to another place; which it was shewn happens especially where two guages are placed, the one on the windward the other on the leeward parapet of a building; the latter being redundant, while the former is deficient in product, the level considered. What proportion of the deficiency in a guage placed on a building should be ascribed to this cause, it may be difficult in all cases, without experiments carefully made on the spot, to decide. It would undoubtedly vary, according to the position of the guage, with respect to the wind by which the rain might be carried at the time. But the question of this difference has lately been discussed in the Journals, on principles purely mathematical. By some, and among them a meteorologist of note in France, *Flaugergues,* it has been attributed wholly to the effect of the wind, in giving an oblique direction to the streams of rain; in consequence of which, it is contended, the funnel or mouth of the guage, actually presents a smaller *aperture,* in proportion as the rain comes more obliquely: just as if we were to incline the funnel to one side under a rain falling vertically, in which case it is manifest that less and less rain would enter as it became more inclined, until in a perfectly horizontal position, the whole would pass by to the ground. But in reply to this, it is said, and I think very justly, by *Meickle,* (in Thomson's Annals for October 1819) that in the case of rain falling with a wind, "the *horizontal* distance of the lines in which the rain falls is absolutely independent of their inclination, being accurately the same, where the wind runs steadily 60 miles an hour, as if it were a perfect calm." "In strictness (this writer further observes) *the drops fall in curves,*" but supposing them to pursue a right line "it is plain, that a guage of the width shown at *a b* will there receive the drops, falling obliquely, just the same as after they become perpendicular in the calm, at *c d.*" And it is equally obvious, from a comparison of the space *b–e* with the space *a–b,* that *of rain so deflected,* a guage with its aperture inclined in a suitable direction, would receive *much more* than the quantity then actually falling on the general surface: consequently that, *with reference to this standard,* the aperture in the direction *a–b* would receive too little.



It appears therefore that no allowance is required, in any position of the guage as to height, for the simple obliquity of the whole body of a shower; the rain received by the entire horizontal surface included in its area (and of which the mouth of the funnel may be considered as a definite part) being the same whether the descent be oblique or vertical.

Mean Annual depth of Rain about London.

The Mean annual depth of Rain in our district is very nearly 25 inches. This being the largest average that has yet, so far as I know, been assigned to London, it will be proper to shew the ground on which it rests.

On the evidence of the experiments in the autumn of 1811 already alluded to, I assume for the present, that the rain on the ground is to that collected at 43 feet above it, as 37 to 28: but in what proportion the difference may increase with a greater elevation, I have not the means of deciding: it is probable that the deficiency at greater elevations would be found in a rapidly diminishing proportion to the height. The guage of the Royal Society is stated to be 75 feet 6 inches above the surrounding ground. But so much of this surrounding ground is covered with buildings, that we may consider the *difference* between the two elevations as nearly done away in regard to practical effect, and I shall therefore neglect it

Annual Rain for twenty-three Years.

The following then is a statement of the annual Rain by the guage of the Royal Society for ten years previous to my own account. In a second column I apply to these amounts the proportion of difference above assumed, to bring out *an estimated result at the surface of the earth.*

Year		Rain at 75 feet.		Rain at the ground by estimate.
1797	....	22·697 in.	....	29·996 in.
1798	....	19·411	....	25·650
1799	....	19·662	....	25·982
1800	....	18·925	....	25·008
1801	....	19·197	....	25·367
1802	....	13·946	....	18·428
1803	....	17·922	....	23·682
1804	....	20·973	....	27·714
1805	....	20·396	....	26·951
1806	....	20·427	....	26·992
	Averages	19·355 in.		25·577 in.

I find the average of seventeen years rain (with some interruption in the series of years,) from 1774 to 1796, to be, by the same authority, 19·762 inches; none of the products composing it appearing to have been collected at the ground.

The *Monthly* results of my own Register for the ten years from 1807 to 1816, are detailed in the General Table D. Many of these, in the fore part of the series, are marked as having been obtained at 43 feet elevation: to the annual totals of these results the same mode of correction has been applied, so far as it was required, and they come out as follows: the Mean Temperature of each year is annexed.

Year	Rain at the ground.	Mean Temp.
1807	18·01 in.	48·367°
1808	23·52	48·633
1809	24·18	49·546
1810	27·51	49·507
1811	24·64	51·190
1812	27·24	47·743
1813	23·56	49·762
1814	26·07	46·967
1815	21·20	49·630
1816	32·37	46·572
Average	24·83 in.	

Lastly, the results obtained at or near the surface, for the years since elapsed, run thus:

1817	24·80	47·834
1818	25·95	50·028
1819	24·30	50·116
Average	24·87	

The General average of all the results thus obtained for the ground, comprehending a period of twenty-three years, is 25·179 inches: I shall apply presently to the several years a definitive correction, through the medium of the monthly results, which brings out an average still nearer to my own above stated.

Wet and Dry Years.

The greatest depth of rain in 23 years fell in 1816. Next to this, for wetness, appears the year 1797.

The driest year in this period was 1807, and next to it, 1802.

About one *year* in five may be said to be subject to the dry extreme, and one in ten to the wet.

After an extreme wet year, in 1797, we meet with four years in succession with an amount of rain very near the average of the climate, and then an extreme dry year: and since the extreme wet year of 1816, we have again had three years in succession near the average.

Connexion of the Annual Rain with the Mean Temperature.

In the series of years from 1810 to 1816, the reader will find, on comparing the rain with the mean temperature, that the warm years were uniformly dry, or below the average in rain, and the cold ones uniformly wet, or above the average. This is a very natural coincidence; but do the effects depend on the alternate warmth and coldness of those years, or rather on the mean temperature considered absolutely? In reference to this question, I may remark, that the mean temperature of 1797 was 49·398, and that of 1816, 49·433 (Royal Society), and their respective amounts of rain at the ground as above stated

29·996 and 32·87 inches. Again, as to dry years, 1802 had a mean temperature of 50·200° with 18·428 inches of rain, and 1807 a mean temperature of 50·733°, with 18·01 inches of rain. There is therefore probably a close connexion between the mean temperature of many years, and the rain at the earth's surface which attends them.

Average proportions of Rain in each month of the year: definitive correction of the amounts for the height.

The product of rain for the same month in different years varies, in each of the months, greatly. This is a fact to which common observation is perfectly competent; and it is scarcely necessary to refer the reader to the General Table D for the proof in figures. Having constructed a similar Table from the Monthly results in the Philosophical Transactions, from 1797 to 1806, I found the same variety in them also. The same month which in one year affords 5 inches of rain, in another exhibits not a quarter of an inch; or even (as appears in two instances) none at all, the few drops that fell having been inappreciable by measure. It became a question therefore, as before in the case of temperature, what should be regarded as the mean quantity; or the standard of comparison to which the product of a wet or a dry month should be referred.

The following are the *averages* of rain for the respective months as obtained by actual observation: the first series on a period of ten years, from 1797 to 1806, by the guage of the Royal Society; the second on a similar period, from 1807 to 1816, from the results in my own register. In a third column are inserted the *average number of days on which any rain fell,* in each month of the latter period.

	Average Rain for the Month by observation at different levels.		Number of days on which it rained
	1797—1806	1807—1816	
1. Jan.	1·341	1·633	14,4
2. Feb.	0·911	1·486	15,8
3. Mar.	0·755	1·422	12,7
4. April	1·282	1·550	14,0
5. May	1·340	1·921	15,8
6. June	1·708	1·928	11,8
7. July	2·555	2·578	16,1
8. Aug.	1·925	2·102	16,3
9. Sept.	1·833	1·522	12,3
10. Oct.	1·671	2·740	16,2
11. Nov.	2·400	2·407	15,0
12. Dec.	1·631	2·093	17,7
Totals	19·352	23·382 in.	

I have not introduced here any correction for the difference of level, because it will be more interesting first to compare the quantities as found.

In general, the average at the lower level exceeds; but in two cases the higher equals, and in one it exceeds the lower: which considering they are for different periods of years was to be expected.

In the months of September and November this is clearly due to excessive rains in those months, in four out of the ten years of the first series.

In October, the lower level is disproportionately in excess, from the same cause operating in the latter series.

Setting aside these cases, let us advert to the Seventh month. Here the rains are alike in both averages: and on examination, the respective Tables of results furnish no adequate reason for this. In 1806 there fell indeed in this month 4·889 inches at the higher level, but in 1800 the month was absolutely dry: the two taken together make an average near the one in the Table; and in other respects the results in each series present a very similar range of quantities.

If we recede again from this to the contiguous month, in either direction, we find in one of these a deficiency of an eighth, in the other of a ninth, in the higher level: which deficiency in the months of Winter and Spring becomes more considerable, the proportion in one instance amounting almost to the half of the sum of the lower product.

The probability is therefore very strong, on the evidence afforded by these averages taken in conjunction with my experiments in 1811, that the deficiency in the rain collected at the higher level, from whatever cause or causes proceeding, is very small in the midst of summer, and increases as we recede in either direction towards winter. In the former season, the showers fall mostly from elevated clouds, and the lower atmosphere is generally clear of that misty precipitation which, in the winter months, must contribute something considerable towards the product at the ground. Add to this that the effect of strong winds, in whatever way it robs the higher guage, must be far most considerable in the latter season.

On these considerations I have ventured to construct a Table of Monthly amounts of Rain, *corrected for the surface of the ground*; in which the rate of allowance is made to increase from 0·05 on an inch in the Seventh month, to 0·50, in the First, and decrease again through the remaining months in like proportion; the rate of gradation being 0·10 in Spring and Autumn, and 0·05 in Summer and Winter. These form the General Table H, at the end of the volume. I am aware that many of the cases, taken singly, cannot be accurate as they stand: there being seasons in which our summer rains resemble the storms of winter, and others in which the latter season has summerlike showers: but the whole twenty years from 1797 to 1816, thus modified, afford an average of 24·808 inches per annum; which, it will be seen, differs by but a very small fraction from the averages found at the surface, or corrected on the evidence of experiment.

The annual results arising out of this mode of correction differ somewhat in amount from those obtained by estimating the deficiency on the whole year. The reader may give the preference (if he pleases) to the latter, or corrected results, without its materially affecting the consequences I have drawn from the *estimated* ones.

It might have been expected that I should have here carried on the parallel between the results of the Royal Society and those of my own guage, through the remaining years published in the Transactions, and thus have settled the difference on the basis of actual observation in each case: but it is with regret that I acknowledge myself defeated in this object by an apparent falling off, of late years, in the conduct of that Register.

The years 1807, 1808, and 1809, present indeed an average of rain which agrees sufficiently with the former averages, and is proportionate to the estimated results at the ground: but in 1810 we have no account of the rain at all; and in 1811, for the latter half of the year only. From 1812 to 1818, the annual average sinks at once to about 15 inches, the former averages deduced from long periods of years, having been about 19½ inches! We have however a statement of the annual rain in 1812, 1813, and 1814, " by another Rain-guage, placed a few feet distant from the former, and 11 feet 6 inches lower," the average of which is 20·349 inches: but the monthly results of this guage have been neglected in the body of the Register, except in some instances where they appear to have crept in by inadvertence, or to be stated on the opposite page by way of contrast to the higher ones, though without notice of this circumstance to the reader. The only reason which I can assign to myself for this extraordinary deficiency in the higher guage is, that the rain being now measured (as it seems) only at long intervals, about a fourth part of that which is actually collected in the year escapes by evaporation.

If this learned and highly respectable body feels the subject of the weather no longer worthy its notice, would it not be better at once to dismiss the Register from its Transactions? But if, as in some sort the representative of our country in matters of science, it should be disposed to entertain an honourable emulation on this point with the Royal Observatory at Paris,* it will be necessary that much greater attention be paid than for several years past, both to the providing the requisite instruments and the due attendance upon them. For it is not in the article of rain alone, that defect or inaccuracy has introduced itself, to the degree almost of suspending confidence: an imputation which after being thus obliged to support (it having been already publicly advanced†) I should be equally ready to contribute in any degree to do away.

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* The "Meteorological Observations made at the Royal Observatory of Paris" are quite a model in point of care and exactness. They are published monthly in the "Journal de Physique;" and the results at least, ought to be given, in our own language and measures, in the periodical Journals of this country.

† By Dalton, *Manchester Memoirs*, vol. 3, *second series*, p. 490.

To return to the subject of the proportion of rain which falls in the different seasons—the following Table exhibits the monthly averages for the level of the ground for two periods of ten years each; the first set, corrected from observations at 75 feet elevation, the second in part corrected from observations at 43 feet, but chiefly as obtained at the ground. The third column exhibits the two averages incorporated.

Monthly averages of Rain, corrected for the elevation.

Month	1797—1806	1807—1816	1797—1816
1. Jan.	2·011	1·907	1·959 in.
2. Feb.	1·320	1·643	1·482
3. Mar.	1·057	1·542	1·299
4. Apr.	1·666	1·719	1·692
5. May	1·608	2·036	1·822
6. June	1·876	1·964	1·920
7. July	2·683	2·592	2·637
8. Aug.	2·117	2·134	2·125
9. Sept.	2·199	1·644	1·921
10. Oct.	2·173	2·872	2·522
11. Nov.	3·360	2·637	2·998
12. Dec.	2·365	2·489	2·427
Totals...	24·435	25·179	24·804

The wettest month, in a long run of years, appears by this method to be the Eleventh, or November; but on the evidence of the latter period, which has the most of actual observation for its support, the Tenth may dispute the precedency in this respect. Yet in perusing the amounts in the third column we see the rain falling off in nearly equal proportions in each direction for two months from the Eleventh; which, as there was not the smallest adjustment to produce this effect, may seem to prove the mode of correction employed nearly accurate.

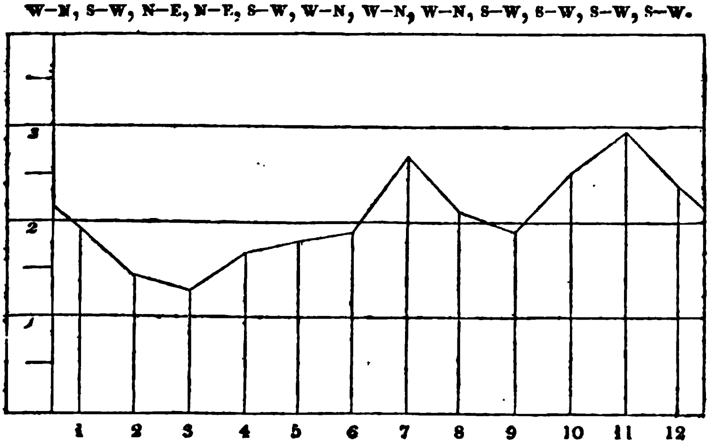
The next amount of rain is the Seventh, or July.

From this month we have a diminishing series of amounts to the Third, or March, which is the driest; having only half as much rain as the Seventh, and a little more than two-fifths of the quantity of the Eleventh month. In the first series of years, the Third month is comparatively dry, and the Ninth wet: in the second series the Third is wet, and the Ninth dry, compared with the general average: the reader will find many examples of the same contrast in the particular years on which the averages are founded.

From the Third month, proceeding forward, we see the rain grow larger in amount to the Seventh, then less to the Ninth, and larger to the Eleventh again.

The following diagram exhibits the gradation of Rain through the year, on a scale of half the depth.

Fig. 11.



Proportions of Rain in the different seasons.

In an Essay read in 1818, by my friend John Dalton, before the Literary and Philosophical Society of Manchester, the author concludes from different averages, "that the first six months of the year must be considered as dry months, and the last six as wet months; that April is the driest month in the year, and the sixth after, or October, the wettest."

My own averages perfectly coincide with his first proposition, if only the slight difference be neglected by which September falls below the mean.

If in the results here advanced the driest average falls a month earlier, and the wettest a month later than in his statement, it may perhaps be attributed to the difference, in exposure and latitude, of the two stations, Manchester and London. The latter may be thought to lose the hibernal rains earlier, from its more forward spring, and to receive them more slowly in consequence of a more prolonged summer.

With regard to the proportions of rain in the former and latter half of the year, they stand thus by the average in the third column:

For the first six months (Jan.—June)	10·174 in.
For the latter six months (July—Dec.)	14·630

The two portions of the year thus divided are nearly equal in their total heat: the sum of the mean temperatures of the first six months being 280,32, and that of the last six 315,47.

But if we divide the circle in another place, we shall have a very different result:

From the Fourth to the Ninth Month inclusive (April—Sept.) the average rain amounts to	12·117 in.
And from the Tenth to the Third inclusive (Oct.—March) to	12·687.

Now the sum of the mean temperatures of the first six months in this series (or the summer half year) is . . . . 345,94; and that of the remaining six months (or the winter half-year) . . . . 249,85.

Thus in dividing the year in one way, we have very unequal amounts of rain for the two moieties, with nearly equal amounts of heat; and in another way, very unequal temperatures, with nearly equal amounts of rain. If instead of taking the results of whole months, the division had been made at the days of extreme and mean temperature, the contrast would probably have been still more perfect, at least as to equal temperatures with unequal rain: but the more direct method suffices for the object.

The solution of the whole case seems to be as follows:

In the former half of the year (that is, from some time in the First month,) the mean diurnal heat is advancing; or if it be kept down by a succession of Northerly winds, these arrive in a state to promote evaporation, and dry up, rather than deposit moisture: in the latter half (that is, from some time in the Seventh month) the heat is declining; or if it be sustained towards the close of the year, by Southerly winds, these coming into a colder latitude deposit their water in consequence. Thus there is prevalent, during the former half of the year, a cause which powerfully counteracts the production of rain; and during the latter half, a cause which more than any other promotes it: the quantities of effect are therefore very unequal.

But in dividing the year at the points of mean temperature, we set these causes in opposition to each other, in either moiety. The effect of the depression of the mean temperature in the last three months of the year, is counteracted by an elevation in the first three months; and the elevation continued through the three months of spring, balances the depression which ensues in the course of the three months after

Midsummer. The quantities of effect in the two moieties are therefore equal.

Consistently with this statement are the proportions of rain for the four quarters of the year, taking (as before in the case of Evaporation) the Twelfth, First, and Second as *Winter*, and the remaining months in classes of three, for the other seasons:

	Rain.		Mean Temp.
Winter..........	5·868 in.	....	37·20°
Spring...........	4·813	....	48·06
Summer	6·682	....	60·80
Autumn....... ..	7·441	....	49·13

The rain, it appears, is not any more than the evaporation, proportionate to the *mean Temperature of the season.* Yet if we add together the mean Rain and mean Evaporation for each season, the *sum of the two* will be found in pretty near proportion to its mean Temperature: the sums are,

For Winter	9·455
For Spring................	13·669
For Summer	18·262
For Autumn	13·885

Proportions of Rain by day and night, &c.

In the early part of my observations I frequently measured off the rain which fell by day, and separated the result from that of the following night. As this was done only through the years 1807 and 1808, which are both below the average in rain, and with the higher guage only, I do not attach much importance to the results.

Of 45 inches of rain, which fell in the space of 31 Lunar revolutions, I divided 21·94, and found 8·67 to have fallen with the Sun above the horizon, and 13·27 during his absence. According to this experiment the rain by day makes only two thirds of the quantity that falls by night.

The greatest rain in twenty-four hours that has fallen under my observation (or rather that of my assistant, for I was shut up in the pacquet going to Helvoetsluys,) was on the day and night of the 26th of Sixth Month 1816. On this occasion, the night in particular was very wet and stormy: the guage at our Laboratory, Stratford, near London, collected 2·05 inches, between 9 a.m. the 26th and the same hour the following morning. I have already noticed the character of that season, which was at once the coldest and the wettest in 20 years. See Table 120, &c. in the First Volume of this work.

In reverting to the column, p. 188, entitled "Number of days on which it rained" in each month, the reader will perhaps be struck with the fact, that in our climate, on an average of years, *it rains nearly every other day, more or less.* He will perceive however, that the number of days (of twenty-four hours) on which there falls any rain, is less in the longest days than in the shortest, in the proportion of two to three.

The propensity to frequent dripping, even in this dry corner of our island, I consider to be connected with our moderate and variable temperature. In climates the mean temperature of which, from the circumstance of latitude alone, departs farther in either direction from the mean Temperature of the Earth, it is probable the number of *dry* days will be found greater, in proportion as the climate is hotter or colder than our own. It will be an interesting enquiry for those who are sufficiently zealous in these pursuits, and who possess the requisite leisure, to follow out the comparison through the many registers of the weather already published. The circumstance of elevation above the sea, which when not excessive greatly tends to promote rain, will require the exclusion of some registers from this comparison; unless indeed the mean rain for a certain range of latitude be deduced from the whole of the registers kept at different elevations within its limits.

Popular adage of "Forty days rain after St. Swithin" how far founded in fact.

The opinion of the people on subjects connected with Natural history is commonly founded in some degree on fact or experience: though in this case, vague and inconsistent conclusions are too frequently drawn from real premises. I have already stated under Tab. 83, that the notion commonly entertained on this subject, if put strictly to the test of experience *at any one station* in this part of the island, will be found fallacious. To do justice to popular observation, I may now state that in a majority of our summers, a showery period, which with some latitude as to time and local circumstances may be admitted to constitute daily rain for forty days, does come on about the time indicated by this tradition: not that any long space before is often so dry as to mark distinctly its commencement.

The tradition, it seems, took origin from the following circumstance. Swithin or *Swithum*, Bishop of *Winchester*, who died in 868, " desired that he might be buried in the open church-yard, and not in the chancel of the minster, as was usual with other bishops, and his request was complied with: but the monks on his being canonized, considering it disgraceful for the saint to lie in a public cemetery, resolved to remove his body into the choir; which was to have been done with solemn procession, on the 15th of July: it rained however so violently for forty days together at this season, that the design was abandoned."* Now, without entering into the case of the Bishop, (who was probably a man of sense, and wished to set the example of a more wholesome, as well as a more humble mode of resigning the perishable clay to the destructive elements) I may observe that the fact of the hindrance of the ceremony by the cause related is sufficiently authenticated by tradition: and the tradition is so far valuable, as it proves that the summers in this Southern part of our island, were subject a thousand years ago to occasional heavy rains, in the same way as at present. Let us see how, in point of fact, the matter now stands.

In 1807, it *rained* with us on the day in question, and a dry time followed. In 1808, it again rained on this day, though but a few drops: there was much lightning in the W at night, yet it was nearly dry to the close of the Lunar period (at the New Moon) on the 22d of this month, the whole period having yielded only a quarter of an inch of rain: but the next moon was very wet, and there fell 5·10 inches of rain.

In 1818 and 1819, it was *dry* on the 15th, and a very dry time in each case followed. The remainder of the summers occurring betwixt 1807 and 1819, appear to come under the general proposition already advanced: but it must be observed that in 1816, the wettest *year* of the series, the Solstitial abundance of rain belongs to the Lunar period *ending* (with the Moon's approach to the Third quarter) on the 16th of the Seventh month; in which period there fell 5·13 inches, while the ensuing period, which falls wholly within the forty days, though it had rain on twenty-five out of thirty days, gave only 2·41 inches.

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* Times Telescope, or Guide to the Almanac. 1814.

I have paid no regard to the change effected in the relative position of this so much noted day by the reformation of the Calendar, because common observation is now directed to the day as we find it in the Almanac; nor would this piece of accuracy, without greater certainty as to a definite commencement of this showery period in former times, have helped us to more conclusive reasoning on the subject.

Solstitial and Equinoctial Rains.

Our year then in respect of *quantities* of rain, exhibits a *dry* and a *wet* moiety. The latter again divides itself into two periods distinctly marked, as the reader will perceive by viewing the two elevations of the curve in fig. 11, p. 193. The first period is that which connects itself with the popular opinion we have been discussing. It may be said on the whole to set in with the decline of the diurnal mean temperature, the maximum of which, we may recollect, has been shewn to follow the Summer Solstice at such an interval, as to fall between the 12th and 25th of the month called July. Now the 15th of that month (or Swithin's day) in the old stile, corresponds to the 26th in the new: so that common observation has long since settled the limits of the effect, without being sensible of its real cause. The operation of this cause being continued usually through great part of the Eighth month, the rain of this month exceeds the mean, by about as much as that of the Ninth falls below it.

The latter wet period corresponds to the second great elevation in the curve. It begins by a large addition to the amount of rain in the Tenth month; its middle and wettest part falls in the Eleventh; and it goes off by a similar gradation of amount in the Twelfth. As the former period apparently takes its origin from the Summer Solstice,* (though, like the highest temperature, not developed till after a certain interval,) so this occupies much of the interval between the Autumnal Equinox and the Winter Solstice, its termination being apparently fixed by the latter. I propose therefore to distinguish the two by the terms, Summer or *Estival,* and *Autumnal* Rains; meaning thereby not the entire quantities of rain falling in the midst of two seasons otherwise dry, which would be inapplicable to our climate, but simply the *excess* of rain, which on a mean of years the two periods afford us.

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* The great rains in Abyssinia and the neighbouring countries, on which depend the annual overflowings of the Nile, have a period nearly coincident with that of our own *Estival* rains. The dry season, according to Bruce, gives place to light rains about the Vernal Equinox, but there falls no considerable quantity in any place until the Sun arrives at the zenith: from which time, until in returning southward he becomes again vertical to them, all these parts are subject to heavy rains; which cease as to the whole country a little before the Autumnal Equinox. The following are the Monthly proportions of the rainy months on a medium of two years, according to a Journal kept by Bruce's assistant *Balugani,* at Gondar in 1770, and at Koscam in 1771.

May	2·609 in.	Aug.	12·794 in.
June	5·347	Sept.	5·086
July	12·224		

And it is remarkable that in these parts of the world they have a second rainy period, of much less extent, and as it seems, less certain than the former; which falls about the close of October and beginning of November. Thus in Summer *we* partake in a less degree, and with

The *Equinoxes* themselves are in our climate comparatively *dry*, the Vernal especially; and they are

some uncertainty, of the operation of the causes which produce the Tropical rains; and in Autumn, the Tropical regions are affected, in a lower degree, by the causes of our more complete precipitation.

I attach little to the shew of minute accuracy with which this Journal of Bruce's is got up; there being, after all, some inconsistencies apparent, owing perhaps to the press: but I think there is internal evidence of its being a real register, which may be depended on for general results. His account of the manner of the falling of those Abyssinian Thunder-showers, in a country so elevated that the Barometer stood at 22 inches is, though very unphilosophical, an interesting record: since the phenomena which he there attempts to describe, may often be witnessed day after day in our own climate, though so near the level of the sea, at the same season. "Every morning in Abyssinia is clear, and the sun shines. About nine, a small cloud not above four feet broad, appears in the East, whirling violently round as if upon an axis; but arrived near the zenith, it first abates its motion, then loses its form, and extends itself greatly, and seems to call up vapours from all opposite quarters. These clouds, having attained nearly the same height, rush against each other with great violence; the air impelled before the heaviest mass or swiftest mover, makes an impression of its own form in the clouds opposite, and the moment it has taken possession of the space made to receive it, the most violent thunder possible to be conceived instantly follows, with rain. After some hours, the sky clears with a wind at North; and it is always disagreeably cold when the Thermometer is below 63°. When the sun is in the Southern tropic, 36 degrees distant from the zenith of Gondar, it is seldom lower than 72°, but it falls to 59° when the sun is immediately vertical." Bruce's Travels, Book 6, chap. 15 and 19.

The whirling cloud, which makes such a figure here as the precursor of the storm, I believe to be the first appearance of the *Cumuli*, which it is afterwards made to call up around it, and which he may have observed at times coming on from the windward with a rapid introversion of the *apex* upon the *body* of the cloud, as sometimes happens here before heavy rain. The rest is merely a confused description of the gathering of a thunder-storm; in which, instead of the air carrying the clouds, the latter are made, like projected solids, to propel the air before them, and thus remove the neighbouring clouds in order to take their places!

attended with the remarkable circumstance of an occasional anticipation (as it were) by the *Vernal,* of a share of the rain which might be expected to accompany the *Autumnal* Equinox. Were it not for this curious connexion, the Ninth month would not be *dry,* but would have its rain above the mean of the year. The reader will find this translation to have happened in the years 1801, 1804, 1810, 1812, 1814, and 1815; by comparing in Tables H and D, the amount of rain for the Third and Ninth months respectively.

Connexion of the Rain with the Winds.

I have placed at the head of the diagram, p. 193, the prevailing wind for each month, or rather the *class* which exhibits the highest number for the month, in the average on ten years given in the Table, p. 158. It appears at once that a wind between North and East is connected with our driest season, about the Vernal Equinox; and a wind between South and West with the wet season following the Autumnal.

There is a regularity in the succession of the winds in the first six months, of which till I came to this part of the work I had not suspected the existence. The classes run thus, W—N, S—W, N—E, N—E, S—W, W—N. After this, the class W—N prevails during the Summer, and the class S—W through the latter four months of the year.

The short notice respecting the temperature proves that a warm vaporous current, probably from the neighbouring Arabian gulf, is decomposed by the action of a colder Northerly one; and the whole of the circumstances represent, on a grander scale, the weather of a wet thundery summer in this climate.

The connexion of a different class of winds with the *Autumnal* from that which prevails during the *Estival* rains, may be admitted as a proof, that the two periods which have been described, are really distinct effects, produced by different arrangements of the causes of rain in the atmosphere.

On summing up the horizontal columns of observations on the wind in Table D, which comprehend a space of ten years, I found the following to be the annual amounts of the several classes; which are here put in comparison with the *corrected amounts of rain* for those years.

	N—E	E—S	S—W	W—N	Var.	Rain.
1807	61	34	113	114	43	20·14 in.
1808	82	38	108	103	35	23·24
1809	68	50	123	91	33	25·28
1810	81	72	78	83	41	28·87
1811	58	59	119	93	36	24·64
1812	82	66	93	91	34	27·24
1813	76	53	92	124	20	23·56
1814	96	65	91	96	17	26·07
1815	68	36	121	107	33	21·20
1816	64	66	106	102	28	32·37
Averages	74	54	105	100	32	25·18 in.

This Table affords some very striking results, as to the manner in which the several annual quantities are related to those of the Rain.

In the driest year of the whole, which is 1807, the class N–E has nearly double the number of the E–S; in 1815, the next for dryness, the same; and in 1808, which stands third, rather more than double.

In 1816, the wettest year, on the contrary, the class E–S *exceeds* the N–E: in 1814, it has two-thirds of the amount of the latter; in 1812, three-fourths; and in 1810, the remaining wet year, the amount comes within a ninth of the N–E, both classes being large, and the Westerly winds falling off in a remarkable manner to make room for them.

The year 1811, which has about an average of rain, has the features, in respect of winds, of a wet year. On examination, I find that 36 out of the 59 observations here forming the E–S class are put down as an E wind: and in 1809 and 1813, the two remaining years, both a little below average, the majority of the observations in the second class are of the same kind.

These proportions, then, confirm the relation, already exhibited in the diagram, of a NE wind to the dry weather; and they establish another relation between a SE wind and the rain, of our climate.

With regard to Westerly winds,—the class W–N, we may observe, falls off gradually during the three years following 1807, while the annual rain increases from year to year: and in four of the remaining years, its number is above the average in the dry years, and below it in the wet ones. There is therefore a manifest general relation of this class to our fair weather.

The winds between the South and West have no decided connexion with either a wet or a dry year.

This proposition may seem at variance with the connexion exhibited in the diagram, and with the remarks upon it, which appear at the beginning of this section: but the contradiction is apparent, not real, as will appear by what follows.

General ideas on the Rain of these Latitudes.

There are two ways in which we may conceive Rain to be produced in a temperate latitude: First, by the cooling of the whole mass of the atmosphere to a degree sufficient to decompose its vapour. This happens when, either the air flowing constantly from the South to the Northward, leaves the influence of the Sun behind it; or the Sun, declining in Autumn and retiring to the Southward, leaves the air to cool where it remains. In effect, both causes may be in action together, as is probably the case during some part of every autumn in these latitudes.

Secondly, by the cooling of a portion only of the air—from the intrusion, or the overflow of a warm vaporous current, from a lower latitude into our own; where it loses its heat, and has its vapour decomposed by our colder air.

In the first case, the rain will be formed in every part of the atmosphere, up to a certain height at least from the ground; where the vapour diffused through a rarefied medium can afford only a kind of hazy precipitation, which gradually descends upon the lower air. In the second case, showers, and hail with thunder, if the contact be very sudden between the currents, are generated; which fall from a greater height, and are commonly much less *continuous* than the other kind of rain.

Both of these modes of production, again, may be in action together for a time. A Southerly current, charged with vapour from a warmer region, may be passing Northward, at the same time that a Northerly current may be returning towards the South in its immediate neighbourhood: and these two may rase each other, the colder running in laterally under the warmer current, and causing it to flow over laterally in its turn, while each pursues in the main its original course. In this case the country, for a considerable space extending from about the line of their junction far into the Southerly current, may be the seat of extensive and continued rain.

In this case, if in any, we may admit the principle advanced by Dr. Hutton, that when two portions of saturated air mix together, the common *temperature* will be reduced to a medium between the temperatures of the two, while the *capacity* of the mixture, or its power of retaining water, will be much below the medium; and precipitation will ensue from this circumstance alone. This principle the Doctor thought applicable to every case of rain that could happen; and not only to these, but to the production of clouds and mists also, in whatever circumstances or situations they may be found.

It is certainly of great importance to establish general principles, on which we may reason conclusively respecting any case which may present itself in Nature; and when informed of the premises, be able to determine that such or such consequences *must* ensue: but I confess I doubt, notwithstanding the authority of more profound reasoners in its favour, whether Meteorology will really gain a step at present by adopting this system.

" That the quantity of vapour capable of entering into air increases in a greater ratio than the temperature," is a proposition which appears to rest on the basis of experiment: but " that whenever two volumes of air of different temperatures are mixed together, each being previously saturated with vapour, a precipitation of a portion of vapour (water) must ensue," is at present demonstrated by no experiment that I know of, and requires, I think, to be reconsidered. The reason given is, that the mean Temperature is not able to support the mean quantity of vapour;[*] but are we sure that the Temperature in this case will be in the Arithmetical mean? We know that such is the result with homogeneous bodies, as with equal volumes of hot and cold water: but volumes of air saturated with water at different temperatures are in the case of heterogeneous bodies: they differ in composition, the warmer air containing the most of aqueous vapour: the specific heat of aqueous vapour is given at 1·55, while that of air is 1·79, water being unity. Such a mixture will therefore probably have a temperature differing from the Arithmetical mean; and *possibly* differing in such a way, as to prevent the precipitation of any water in consequence of the equal distribution of the heat in the mixture.

I am doubtful, secondly, of the fact of the intimate mixture of large masses of the atmosphere in the manner, and to the extent required by this hypothesis. The natural appearances are against it: we can often trace, during the approach and in the intervals of rain, the gradual descent or subsidence of a superiour current, which sooner or later manifests itself at the surface, by a wind there flowing in the same direction. Often, in summer, more than two of these may be detected; which, after quietly flowing over each other, without any extraordinary precipitation, or in some cases (as when observed by means of balloons) without any turbidness at all, come down in succession, during several subsequent days of fair weather. Supposing these to have been all saturated with water, what should have made them more liable to mix than in the case described? That they do not mix at all in the plane of contact, is not what I maintain; but simply, that the intimate mixture of the whole elements of the atmosphere, from the height of some thousand feet down to the earth, and this every time that it rains largely, is not from appearances a probable supposition.

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[*] Dalton, Manchester Memoirs, vol. iii. second series.

Many phenomena attending the production of dew, mists and clouds, might be cited as adverse to the opinion of such extensive intermixtures of the higher and lower atmosphere: but leaving the question of the *modus operandi* in the case, to be settled by those who incline further to discuss it, I may state, as matter of experience, that the contact and opposition of different currents *charged with aqueous vapour,* and (by inference from their state as they manifest themselves in succession at the surface) *differing in temperature,* is largely concerned in the production of our Vernal and Estival rains.

When after a suffocating heat with moisture, and the gradual accumulation of Thunder-clouds, followed by discharges of Electricity, I observe a kind of Icicles* falling from the clouds, then large hail, and finally rain; and when after this I perceive a cold Westerly or Northerly wind to prevail, I have a right to infer, that the latter, aided by the electrical energies, has been acting, *as a cold body in mass,* in a sudden and decided manner, on the warm air in which I was placed before the storm. Again, when after a cold dry North-East wind I behold the sky clouded, and feel the first drops of rain warm to the sense; and after a copious shower perceive the air below changed to a state of comparative warmth and softness, I may with equal reason conclude, that the Southerly wind has displaced the Northerly; manifesting itself first in the higher atmosphere, and losing some of its water by refrigeration in the course of the change. Doubtless *mixture,* in each case, obtains to a certain degree, and accelerates the effect; but it does not appear to me a *necessary* previous condition. On the contrary, the occurrence of rain, when the air is rather dry by the Hygrometer below (as sometimes happens) with the sudden increase of evaporation which often ensues upon rain, convince me that *temperature* may effect an occasional precipitation at the plane of contact, such as the general state of the atmosphere, had time been given for its operation, would have prevented. Nothing is more common than to see vapour issuing into a *dry* air (provided it be cold enough) decomposed by the contact of the latter, and yielding a copious *steam,* which is presently afterwards taken up again. In the same manner I suppose an occasional precipitation to take place, even to the degree of rain, by the mere circumstance of the sudden translation of a vaporous current into the midst of a cold medium; or of the irruption of the latter upon vaporous air at rest.

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* I witnessed such a phenomenon at Meriden near Coventry, on the 19th of Seventh Mo. 1803, when the large hail broke the windows in that city. The reader will find a more striking instance of intense sudden precipitation, in the account of the Gloucester Thunder-storm, under Tab. 21, in my first volume.

I make no use here of the effect of different electricities, which may obtain in currents brought from a distance and acting on those which they meet, to produce rain; because I am inclined rather to consider the electrical phenomena attendant on rain as secondary, and depending on the previous separation of watery particles in some degree of aggregation, by the great and universal cause of rain, *depression of the temperature of vapour.*

The previous reasoning is meant to apply to the apparent anomaly, of a Northwest wind predominating in our wettest season in summer, and a Southwest during the autumnal rains. I conclude from a careful review of the cases, that the former is not the carrier, but the *condenser* of the vapour; which appears to be introduced at intervals only, from the South and South-East. When the surplus vapour has been disposed of in rain on these occasions, the North-West resumes its sway, the atmosphere recovers its transparency—et *claro* cernes sylvas *Aquilone* moveri. Virgil, Georgic. 1: but it is usually not long before the returning clouds indicate the near approach of a new supply of vapour—namque urget ab alto *Notus*. Idem. The means by which we sometimes escape the rains, and enjoy a dry and hot summer, may be a subject of notice further on.

In the decline of the year the rain appears to originate, as before observed, in a somewhat different way. The great body of the atmosphere is then usually moving with some force from South-West to North-East, while the Sun is declining to the Southward. An air already turbid from beginning precipitation, is further charged, below, by an excess of evaporation from the agitation of much watery surface over which it passes. Every calm interval then affords its shower, followed by wind and evaporation again: and a succession of gales by night and cloudy days, characterise the approach to the hibernal season. Exceptions however are found here, as in the former case; the autumnal rains being sometimes (though rarely) scanty, and the weather more inclined to frost.

As however the whole of this reasoning has proceeded upon the evidence of general results and averages, it may now be suitable to apply it to particular cases, of the connexion of rain with the variation and succession of the winds. The observations on the latter, having been conducted without the slightest previous intention of establishing such general principles as have been here advanced, the reader will be aware that many changes favorable to the hypothesis may have been overlooked. He will also be aware that a current from North or South may at times move through a considerable space in the higher atmosphere, and there be spent; manifesting itself below only by the precipitations which it occasions: also that the prevalent wind of the winter season, the South-West, must be allowed occasionally the same operation on an intruding vaporous current from the South-East, as has been ascribed to the more direct antagonist of the latter, the North-West.

Particular cases of Rain, &c. examined.

Tab. 1—2. In these two periods a mean quantity of rain was brought by strong SW winds. Once, when there fell 0·63 in. the nocturnal Temp. was depressed 12°, several hoar frosts ensued, and a positive electricity was manifested before the rain: all which indicates the interference by night of a Northerly wind.

A Thunder-storm (Dec. 2) seems to be connected with the ensuing dry winter.

Feb. 6—7. After a dry time of long continuance, the Fifth Month gave betwixt two and three inches in the first 15 days, *six* of which had variable winds. During these rains, which brought warm weather, (although from NE and E,) there was an abundant developement of electricity. On a sudden depression of Temp. at the close of the month, there fell 0·82 in.:

the wind getting to S and Var.: then, after two days fair with NW, the return of variable winds brought an inch and a quarter of rain. After which, with Westerly winds, the whole period, Tab. 8, was dry and *non-electric*; though upon the change from SW by W to NW, some thunder clouds made their appearance.

Tab. 10. In this period we have a rain of 0·93 in.: from the NW displacing the SE, attended with much lightning in the night: max. Temp. depressed from 81° to 72°.

Tab. 11. A rain of 0·65 in. clearly due to a depression of Temp. (by a Northerly current) of 10° on the day and night. And towards the close, immediately after the Autumnal Equinox, a wet week, apparently from a mere South wind, which *raised* the Temperature, while the Barometer fell.

Tab. 12. In the latter part of this period, we have seven wet days with a considerable depression of both Barometer and Thermometer, indicating an extensive decomposition of the aqueous atmosphere, the brunt of which appears by the note to have fallen upon the country about *Paris*. The winds are here a perfect mixture, viz. S, Var., NW, N, SE, E, N, SW, W, N: crossing the compass in both directions.

Tab. 13. Here we have 0·61 in. of *snow* by the NW supervening upon the SE: the latter wind is inserted upon the authority of the Philo. Trans. as my own observation is wanting. In the same period, 0·49 in. *snow* and *rain*, connected with 3 days *Var.*

Tab. 15. The first days of 1808 presented an example of the effects of the interference of a partial current. A course of dry SW winds, of eighteen days duration, is interrupted in the middle by one day *South*, probably in its origin SE; the result is 0·65 in. of rain.

Tab. 18. After four days *variable* winds, 0·59 in. of water from *snow*, attended with positive and negative electricity. This was on the 20th of the Fourth Month, 1808. The 17th of the same month in 1807 was distinguished by a snow-storm, and the 19th by a succession of electrical Nimbi discharging dry hail: and the 20th, and 21st of the same in 1809, by plentiful snows, followed by hail and rain. In the two latter cases the NE and SE winds appear to have been in simultaneous action: in 1808 the winds are not specified. This analogy gives place to fair weather at the same season in 1810: but in the subsequent years, I find *hail* noted, for the most part, about the same time in the month. There is therefore probably a periodical current from the North at this season, in the higher atmosphere, the arrival of which is determined by the Sun's progress in North declination.

A case remarkably analogous, and which may prove important in regard to a future theory of the Atmospherical variations, occurs while I am occupied with the present sheet of this work. On the 19th instant (Second month 1820) after a considerable depression of Temperature for the season (there having been no snow for near a month,) it began to *snow* early in the afternoon, and there fell in the course of the ensuing night and day a considerable quantity, making 0·78 in the guage when melted. Now, from the 21st of the Twelfth Month (the shortest day) to the date of this snow, is sixty days; and from the date of the heavy snow with which this winter began (prematurely as we thought) at noon, on the 22d of Tenth Month, to the shortest day, is also sixty days. Should the winter terminate with this snow, which has been followed, after a thaw, by some night-frosts, it will have lasted, with the usual mild intervals included, an hundred and twenty days, beginning and ending at the same point of the Sun's declination. In this respect, then, our winter will have been coincident, for once, with that of a much higher latitude: and as we have been intruding of late years, with our ships of discovery, into the polar circle, the *North* may be said to have *returned the visit!*

To proceed.—Tab. 22 exhibits a good specimen of the Solstitial rains. The period begins with a SE wind, and a max. Temp. of 85°. In five days, with 2·76 in. of rain, and thunder, it is lowered to 67°, the Temp. of the nights keeping up: the winds these five days as follow, S, NW, NE, E, W. The Evaporation, which is about 0·10 in. *per diem,* certainly proves nothing in favour of a *saturated* state of the lower air all this time. The NW, W, and SW prevailed on the few fair days in this period, which had 5·10 in. of rain. See also Tab. 47. 59.

In Tab. 25, we have several considerable amounts of rain brought by strong SW winds: while a little rain likewise attends the interruption of the course of NE immediately succeeding.

Tab. 31. Here we have a remarkable succession of the daily winds during rain, *and which proves introductory to fair weather.* First, Fourth month 14, *var.* with thunder and hail, then SW, W, NW, N, SE, NE, and, after a few days of changeable winds, the reverse order, NE, N, NW, W, SW, with a day *variable* at the commencement of the dry weather; which prevailed for the most part during the month after.

Tab. 42. In this period, at the beginning of Spring, we have a striking contrast between the effects of the Southerly and Northerly winds: a course of the former, with daily rain, giving place in the middle of the period, to a course of the latter, with dry weather and frequent hoar frosts.

Tab. 51. (Eleventh month 19 to Twelfth month 18, 1810.) We have here the enormous amount of 5.54 inches of rain in the space of 30 days, with appropriate winds, and an *electricity* which might have become the heats of summer. Whether from this cause, or from the temperate warmth and moisture by night, or both united, the *ignis fatuus,* a phenomenon scarce known in this part of the island, appeared in the marshes near our Laboratory, on several nights during a very wet week; and gave place only to the overflowing of the river, which laid the ground under water. I did not get to see this rare visitant, and am consequently unable to speculate from actual observation upon its nature: but some circumstances which were told me by an eye witness, respecting the brightness and swift gliding motion of the lights, induced me to think them electrical; and I am disposed to class them in the present instance with the smaller kind of *shooting stars,* though making their appearance in so very different a region of the atmosphere. It is possible that the evolution of phosphuretted hydrogen gas may sometimes produce luminous phenomena in these situations; but on this supposition they ought to appear more frequently: lastly, to conclude these conjectures, there are extant descriptions of *ignes fatui,* which are scarcely to be explained on any other hypothesis, than that some insect, with which we are perhaps acquainted in its ordinary appearance by day, becomes luminous when collected into dense swarms, and flying thus by night.

There is annexed to the results of the preceding period (Tab. 50) an extract from the Papers, in which a meteor is described of such a nature that, supposing the relation true in all particulars, it would be difficult to bring it under any class of phenomena yet established. I gave this confused statement as I found it, to serve for the use of any observer in whose way such an appearance may chance to come hereafter.

Tab. 61. A contrast in the opposite season (if we include also a few days of 60) to the arrangement of winds and rain in Tab. 42. Here we have a course of dry Northerly and Easterly winds, followed by a series of Westerly gales with daily rain; the introduction of the latter being marked by *three* days of SE and S; and one *variable.*

The crossing of the currents, and the effects of their mutual contact in electrical precipitation, appear in some extracts from the Papers annexed to this period. See the Notes respecting the winds at *Plymouth* and *Harwich*: and compare with these the winds at *Plymouth* and *Hull,* under Tab. 67. Both cases being evidently connected with the Equinoctial season, and introductory to rains about equal in amount and duration.

Tab. 65, 66, and 74, exhibit a great number of instances of the connexion of the S and SE crossed by the NW, as also of the variable winds, with heavy rain, both in the early and latter part of the year. The usual electrical phenomena ensue, upon the copious decomposition of the vapour, in each season.

Tab. 69. In this period the gradual *southing* of the wind before rain is thus *twice* exhibited in its daily changes, 1. NE, E, SE, SW; then under different winds during a week, 0.60 in. rain. 2. N, NE, E, SW; during this, again, 0.61 in. rain, and immediately with *var.* for one day, 0.60 in. rain. Then, NW a day, *fair*: then, E, SE, SW; S, SE, SW;

S, SW; with 0.55 in. rain in 10 days; after which followed two weeks of dry weather with a high barometer.

Tab. 81 has a curious mixture of winds, with continued rains, in the Spring season; and, as usual, thunder: but it would be tedious to point out to the reader the many cases which he may find (if disposed to prosecute the enquiry) in these Tables.

Probable sources of the Vapour brought by different Winds.

The introduction of a surplus of vapour from the S or SE, and its decomposition by the prevalent NW, and in some cases the W and SW winds, will now be evident: as likewise the reason why the SE wind is so intimately connected with electrical indications, with hail and thunder.

Vapour brought to us by such a wind must have been generated in countries lying to the South and East of our island. It is therefore probably in the extensive vallies watered by the Meuse, the Moselle and the Rhine, if not from the more distant Elbe, with the Oder and Weser, that the water rises, in the midst of sunshine, which is soon afterwards to form *our* clouds, and pour down in *our* Thunder-showers. And this island, in all probability, does the same office for Ireland: nay, the Eastern for the Western counties. My attention was lately called to this subject by a striking fact, which occurred in preparing for the press the 131st Table of this volume. After nearly nine days wet weather, attended as usual with mixed winds, in our district, upon the wind changing from SE to NE, it became fair with us; and on the same day (the 26th of Fifth Mo. 1817) a rain of three days and nights commenced in the country East of the Upper Rhine about *Stuttgard,* so heavy as to produce a serious inundation. In the mean time we had no rain, though the Barometer was still very low, and the change of wind above mentioned had been attended with thunder. The rain ceased in those parts upon the evening of the 28th, and on the next two days it rained again with us. To suppose a connexion of the phenomena at this distance on electrical principles may be too much: but I think one may be made out through the medium of the winds, in this manner. The evaporation of a tract of country lying to the East of both stations, might in the first instance be conveyed to the Thames, and then, by a change in the direction of the prevailing wind, to the sources of the Rhine: and decomposed into rain, with us by the effect of a colder latitude; and with them by that of the elevation of the country, aided probably in both cases by opposing currents.

Thus, drought and sunshine in one part of Europe may be as necessary to the production of a wet season in another, as it is on the great scale of the continents of Africa and South America; where the plains, during one half of the year, are burnt up, to feed the springs of the mountains; which in their turn contribute to inundate the fertile vallies, and prepare them for a luxuriant vegetation. And we may now be more able to understand the unequal distribution of the wet summer of 1816; when as I have already stated, under Tab. 122, the middle of Europe was suffering from excessive rains, at the same time that the North, or the parts East of the Baltic at least, about Dantzig and Riga, were suffering from drought, and in all probability furnishing the water.

In the Spring and Summer, both the direction of the winds, and the relative state of Temperature, seem to forbid our receiving much rain from the Atlantic. But in winter, when the surface of the ocean is giving out heat to the air, it may be supposed also to give out vapour, in greater quantities than the Temperature of the air is prepared to sustain. Hence the Atlantic, during the winter months, or rather in the interval between the Autumnal equinox and the Winter solstice, is probably the great source of our rains. The impetuous gales which, at this season move over its surface, and impinge on our Western shores, may *possibly* bring us much vapour from the superior atmosphere of the tropic where they originate. The powerful manifestations of Electricity which at times attend them, seem to favour this opinion. But should they have deposited much water on the passage, we may still find, in the relative winter temperatures of the air on our coasts and the ocean, a sufficient reason for the *turbid* state in which they are almost uniformly found on their arrival.

OF THE LUNAR PERIODS.

The Variations of the winds and temperature have been shewn to have an intimate connexion with the Rains of our climate. There is another relation of the kind, much more generally attended to, and on which it might now be expected that I should say something; I mean, that of the Rain to the indications of the *Barometer*.

That the Barometer descends gradually before rain, and rises during or subsequent to it, and thus indicates the return of fair weather, is matter too trite for me to enlarge on here: and that the *mean* of the observations is higher in the dry and fair periods, and consequently in the years in which these predominate, than in the wet ones, is what every attentive reader must have found abundantly proved in the results which have been before him. The reason of this must even have become evident; and he will now scarcely need to be reminded, that the air *weighs more* when it is warmed and charged with transparent vapour to a great elevation by sunshine, than when, being chilled by the long nights of winter, it is shrouded in stormy clouds, and undergoing continual decomposition.

But furnished only with these general notices, he will find himself at a loss to explain many of the movements of the column: to know why it is generally high in severe frost, or with a North-east wind; and why sometimes very low without the expected accompaniment of much rain: in short, he will desire to account for those large sweeps which it makes occasionally. without any regular connexion with the changes of wind or weather; and for its apparent stagnation at other times, about a middle point of elevation, while the most obvious perturbation in the atmosphere is going on, and rain and thunder occur daily. Nor will the sudden depressions attending our southerly gales, and the rapid manner in which the former level is restored after them, escape his enquiry. A clew to the chief of these difficulties is furnished by the certainty, now sufficiently ascertained, that the atmosphere is subject, like the *liquid* ocean, to the attractive influence of the Moon, and from this cause, operating jointly with the Sun's power, it has *its tides and currents.* It was from the supposition of this fact, not indeed without some ground of observation, that I was induced to cast my Reports on the weather into the form of *Lunar periods.* I shall not undertake here to give the theory of the Lunar tides in the atmosphere. Indeed what I have hitherto learned respecting them, appears to constitute but an imperfect glimpse of this difficult subject; which will now possibly claim the attention of men duly qualified to investigate it; to whose service the materials to be found in these volumes, and which constitute a greater store than I can pretend to use, are cheerfully dedicated. They will be extracted however the most readily by those who will first condescend to go through the labour of proving, to themselves, the general correctness of the following details of my progress hitherto.

Influence of the Moon on the variable pressure of the Atmosphere, on the Temperature, Winds and Rain.

1. By the Moon's change of place in her orbit.

A series of observations which I made in the year 1798, on the variations of the Barometer in connexion with the Lunar phases, may be found, illustrated by a plate, in Tilloch's Magazine.*

In registering the movements of the Barometer at that time, I employed instead of figures a curve, traced from day to day on a graduated Chart, sold for that purpose by a Copper-plate printer in London. Finding by the specimen which accompanied these blank Registers, each of which served for a month, that the Moon's phases were to be inserted where they occurred, by an appropriate sign, at the top of the column for the day, I adopted the practice, not without some previous, though slight, information on the subject.

My observations had not proceeded far, before I perceived a coincidence of the greater *elevations* of the Barometer with the Moon's First and Third *quarters*, and of the greater *depressions* with the *New* and *Full* Moon. When the year had been completed on my charts, I gave an account of the subject to the *Askesian Society*; a select company which met every fortnight, at the house of my friend William Allen, in London, for the purpose of philosophical discussion. By this society they were favorably received and published: the substance of the paper was as follows:

In above thirty out of the fifty lunar weeks of that year, the curve reprsenting the movements of the Barometer changed its direction in such a way, as to be either falling, or at its minimum for the space of two weeks, under the phases of New and Full Moon; and rising, or at its maximum for the like space, under the First and Third quarters.

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* Philo. Mag. vol. 7, p. 365, &c.

The remainder of the year presented exceptions sufficiently decided to forbid this coincidence being taken for a general rule. The case was sometimes indeed reversed, so that a low Barometer coincided with the Quarters, and a high one with the Full and New. And perceiving that the *rule* obtained chiefly in moderate and settled weather, and the exceptions when it was stormy, frosty or inclined to thunder, I came to the conclusion, that the former mode of variation exhibited the regular Lunar Tides, and the latter, such a mixture of tide and currents as might be expected to belong to a perturbed state of the atmosphere.

To ascertain the effect of each Lunar position, independently of the variations supposed to be produced by currents, I took the following method: The height of the column at the time of the occurrence of each phase was taken, and the separate observations falling under each class reduced to an average; which average was then compared with that of the whole of the observations thus taken, The mean of the whole was

29·9638 in.

Average at Full Moon 29·906
which is less than the mean ,0578 in.
at Third Quarter 30·153
which is more than the mean ,1892
at New Moon 29·719
which is less than the mean ,2448
at First Quarter 29·980
which is more than the mean ,0162

The result of each position was thus found, on the whole, to agree with the *rule*; but was by no means in proportion to its occasional manifestations. For, in the course of the first seven weeks of the year, there appeared three great elevations in the curve, the summits of which were nearly coincident with the First or Third quarter; and one of them precisely so with the Third quarter, at the extraordinary height of 30·89 inches. The Barometer was the same from which my observations are still registered, and was in perfect order at the time. The *mean* of the season was however a very high one; so that this pyramid stood on an elevated base. On the other hand, the most remarkable depression of the year, to 28·60 in., occurred only twelve hours from the time of New Moon; and several other considerable depressions were nearly coincident with New or Full Moon.

I determined, upon this, to extend the enquiry, and I selected for the purpose the years from 1787 to 1796 inclusive, as they stood in the Register of the Royal Society. The results, obtained by the same method, were as follows.

Mean of the observations taken out 29·818 in.

Average at Full Moon	29·7812	
which is less than the mean		,0368 in.
at Third Quarter	29·8823	
which is more than the mean		,0643
at New Moon	29·7946	
which is less than the mean		,0234
at First Quarter	29·8910	
which is more than the mean		,0730

It was not to be doubted that these numbers presented a more correct scale of the effects, than could be expected from any single year's observations. Assuming therefore the elevation of 29·818 as the standard of comparison, I concluded that the Barometer is depressed, on an average, about a tenth of an inch by the change of the Moon's position from either quarter to the Full or New, and elevated in the same proportion by her return to the quarters. It would have been more correct to have taken for the standard the mean of the whole ten years observations in that Register, or 29·89 inches; and to have stated the effects thus: the Barometer, on an average of ten years at London, suffers a depression of about a tenth of an inch, by the influence of New and Full Moon respectively: but at the First and Third quarters the Moon's influence is, in respect of position in her orbit, neutral, producing neither elevation nor depression in the Barometer.

Having satisfied myself as to the fact of an influence of the Moon upon the variable pressure of the atmosphere, I proceeded to draw a parallel between this case and the tides in the Ocean, thus: "I suppose therefore, that the joint attraction of the Sun and Moon at New Moon, and the attraction of the Sun predominating over the Moon's weaker attraction at the Full, tend to depress the Barometer, by taking off from the weight of the atmosphere (its counterpoise) as they produce a high tide in the waters by taking off from their gravity: and that the attraction of the Moon, neutralised at the quarters by that of the Sun, tends to make a high Barometer, together with a low tide in the waters, by permitting each fluid to press with additional gravity upon the Earth."

An objection was then anticipated which might arise from the circumstance of the *diurnal* tides being the most considerable in the ocean, and the weekly elevations and depressions contributing, as they proceed, but a moderate proportion to each day's tide: whereas, in the *atmosphere* of these latitudes, where the weekly elevations and depressions go to so large an extent, the diurnal tide is scarce perceptible. This objection was attempted to be met by some reasons, founded on the very different physical constitutions of the air and ocean; the latter being pretty uniform in density and composition, while the former is variable in these respects, and subject moreover, by the rapid changes of temperature which it undergoes, to currents which move in different directions with much greater freedom than in the ocean. It was also stated that at Calcutta, where the weekly variation, as in low latitudes generally, is very small, a daily tide had been distinctly traced by the alternate elevations and depressions of the Barometer. I have also since the date of this essay, met with strong indications of a daily tide in Registers of a much higher latitude.

This paper had in substance the following conclusion: " It will be soon enough, however, to enter upon the Theory of the Atmospherical tides, when the facts shall have been examined, and the influence of the Sun and Moon on the atmosphere established by more extensive observations. For this purpose the subject is now brought forward, and the co-operation of observers in this or other countries is requested. The coincidence, as far as hitherto observed is an important fact, and should it be found to obtain generally, will lead to important consequences, and in the first place to a new and more satisfactory theory of the Barometer. The true reason, likewise, of the weather so frequently agreeing in its changes with those of the Moon (a coincidence which has long served to direct the predictions of the Almanacmakers) will be apparent; and the meteorologist will avail himself of this, to form probable conjectures on the changes likely to arise for a certain time, not exceeding that which limits the operation of the known cause or causes."

Such was the state of my information on this subject twenty years ago. The study of the modifications of clouds, and the various phenomena connected with them, afterwards occupying my attention, this particular enquiry was suspended: and when, in 1806, I began a regular Meteorological Journal, it was with more general views. But being still desirous of putting to the test the opinion of a Lunar tide in the Atmosphere, I was induced, as already mentioned, to digest the observations in the form which seemed to afford the greatest facility for this purpose. It remains to show how far the purpose was fulfilled.

Plate 4 exhibits, in a system of curves, the variation of the *daily mean height* of the Barometer through the *Solar year* 1806—7. These curves are constructed from the Tables, 2 to 14 inclusive, in vol. 1, but with a different arrangement of the periods. For the sake of shewing more evidently the influence of New and Full Moon, the periods are here made to begin with the day of the third quarter; which happens in this instance to be the first day of 1807. After a dotted curve therefore, giving the variation from Dec. 22, 1806 to the end of that year, the several curves *a—b*, *b—c*, &c. carry on a series of entire Lunar periods to the 21st of Dec. 1807, at *n*, where the Solar year closes.

To construct these curves, the *mean of the period* is first ascertained by calculation, and represented by a horizontal line. The relation of the *mean of each day* to this standard line is next ascertained and marked; and a curve carried through the points thus found, represents the variation, at its proper extent, above and below the standard. In doing this, the mean of the day on which a Lunar phase happens, is made always to fall in the intersection of the curve with a perpendicular line appropriated to that phase Some inequalities of time in the intermediate parts of the curve, occasioned by this arrangement, are remedied, where needful, by using an unequal scale of time in those parts.

By this method the curves were all obtained of an equal length, and presenting equably the relation of the Lunar points to the Barometrical mean for the period. Their tendency to rise and fall at particular intervals, and their consent or opposition in such movements, was thus also represented *independently of the absolute place of the mean of the period, or of that of each day, in the Barometrical scale.* Each of the four horizontal lines, on which the curves are made to play, has therefore an elevation peculiar to itself, and relative only to the curve in connexion with which it is viewed: its absolute place in the scale of the Barometer may be gathered from the small curve at the bottom of the diagram; where these monthly means are laid down upon the mean of this Solar year, which is 29.815 inches.

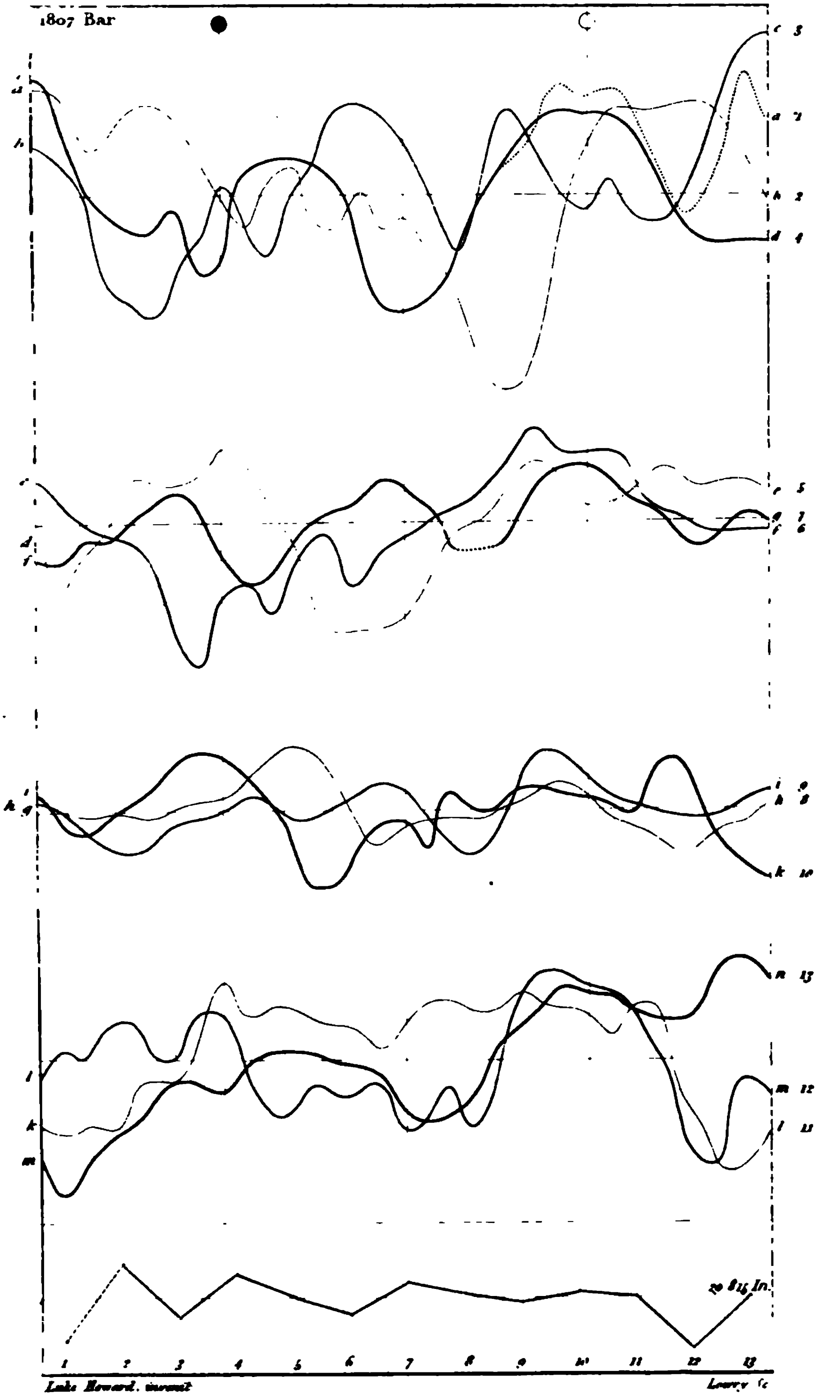
All this contrivance was needful in order to exhibit the distinct effect of each Lunar position, unmixed with that kind of variation, from month to month, in the mean of the Barometer, which depends on the season of the year; and of which an account has been given page 150—152, founded, it will be recollected, on a mean of several years.

To proceed now to the application—it is difficult not to be struck at first sight with the evident marks of *system,* which these curves exhibit, from the beginning to the end of the series. Were it possible to obtain, at successive equal intervals of time, the profile of the waves which roll after each other on the surface of the ocean, and were we to reduce these to a scale in like manner, it is not to be doubted that the group would present elevations and depressions indifferently, in all parts of the scale of time; and the intersections of the curves would soon produce confusion in the picture. But it is not so here—the wave occurs too often in the same place; and the intermediate depressions are too regular, for us to admit, that what is called *chance* has any considerable share in producing them.

The most prominent feature of the piece may be said to be, the nearly constant *elevation of the curve* at the approach of *Full Moon*—a very contrary result, certainly, to that found in the year 1798, and sufficient, at first view, to invalidate the partial conclusion I then came to, that the true atmospherical tide consisted, in part, of large depressions at this quarter. These elevations, however, will be found to have their *apex,* for the most part about two days before the Full, and to be going off at the time of the phasis. That they are properly connected with its approach, may be fairly inferred, from the manner in which the curve No. 2 rises at this time from a great depression, as if prevented from taking an upward tendency by some unusual cause, and become more elastic in consequence of being thus strongly bent downward.

If we now turn to the *New Moon,* on the left of the plate, we perceive its approach marked, by depressions chiefly in the fore part of the year, and by ele-

to face P 230. *Plate 4*



Luke Howard. invenit *Lowry sc*

vations in the latter part. Yet the actual time of this position, or rather a day or two after it, exhibits a strong tendency in the diurnal variation to return to the mean of the period: and the same observation applies to both the other *quarters*; which have also some peculiar *opposite* variations connected with them. The latter are conspicuous in the elevations which belong to the *third quarter* of the first three periods, and in the depressions which attach to it in the last three: each however with an exception attached: see Nos. 4 and 13.

Enough has perhaps been pointed out, to satisfy the reader that in this year, there was a decided connexion between the Lunar positions, and the mean daily movements of the Barometer; which deviated in the same direction about the same point of a Lunar revolution, whether the mean of the season occupied the higher, lower, or middle part of the scale.

A certain relation was long since found to obtain between the movements of the Barometer and the variations of Temperature in the atmosphere: and very early in the course of these enquiries I perceived, on tracing the curve of the diurnal mean temperature on the same scale, and referable to the same mean line, with that of the Barometer, that the connexion was almost constant between them. It is manifested in two different ways, which may be termed conjunction and opposition; since in the one, the curve of the mean temperature accompanies (or precedes or follows by a short interval) that of the Barometer, and in the other the two vary in opposite directions, often with a very near coincidence in time. See Fig. 12, p. 235.

Two degrees of Fahrenheit are equivalent in these variations to a tenth of an inch in the Barometer. Such are the proportions observed in this figure, the parts of which are copied from some of the many periods I have traced in this way. When the two curves run in opposition through a period, they cross at intervals, and form a succession of rhombs, differing in magnitude according to the extent of variation in either or both of the curves: when the two run in conjunction, the resemblance in the number and extent of the changes is often so close that the one might easily be mistaken for the other. There are also many periods in which both the kinds of relation appear; and some in which neither is very obvious.

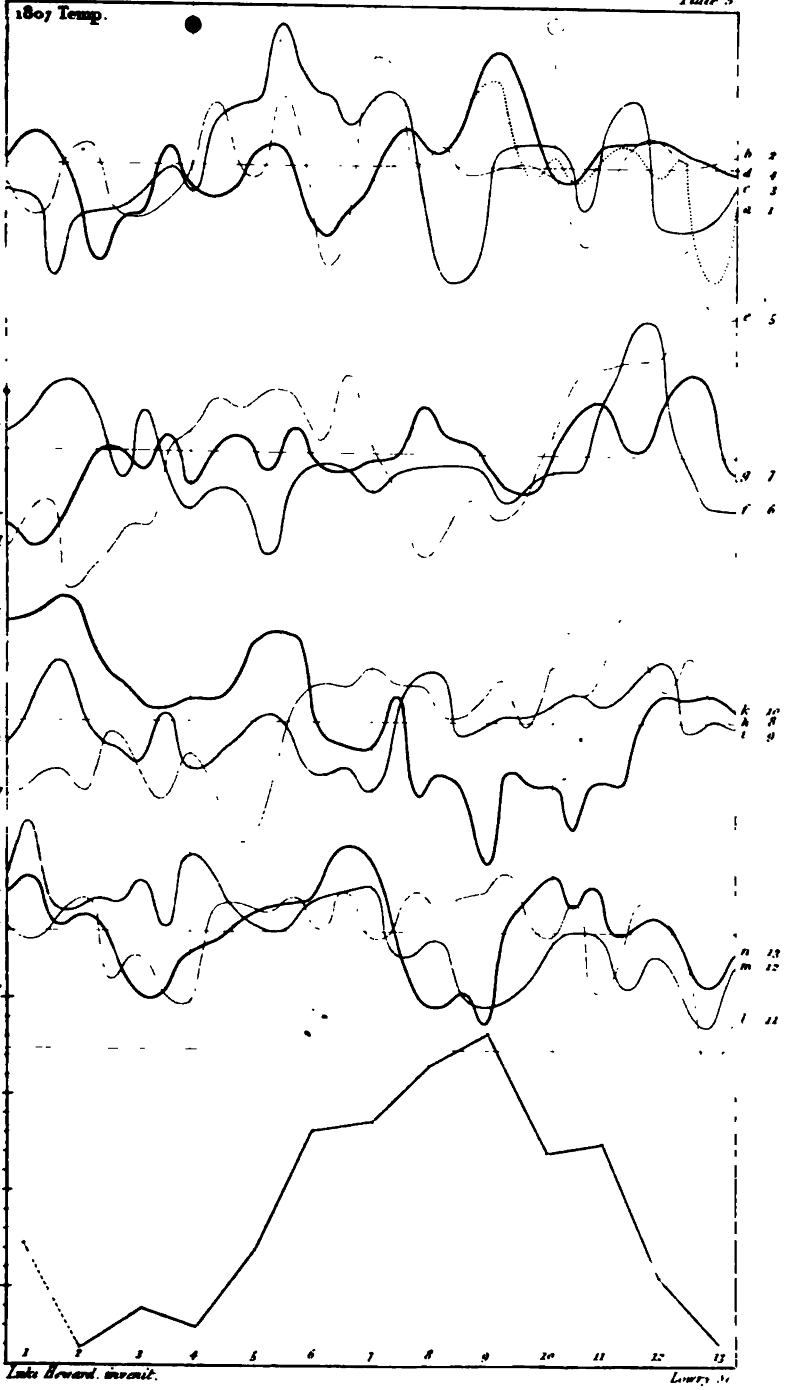
In Plate 5, the variations of the *daily mean temperature* through the Solar year 1806–7 are traced in curves, bearing the proportion already mentioned to those of the Barometer, and constructed in other respects on precisely the same plan as in Plate 4. The corresponding numbers on the curves in each Plate will serve to connect those of the Temperature with the Barometrical ones for the same periods.

The place of the *mean line of each period* in the Thermometrical scale, is indicated in the curve at the bottom of the plate.

These curves present features in some respects less striking than those of the Barometrical variation; but which, when attentively examined, indicate equally the existence of a system of variations, governed by the Moon's attraction, as a secondary cause, subject on the whole of the year, to the more powerful influence of the Sun as he varies in declination.

The greater variations of Temperature, it may be first remarked, appear for the most part during this year in the intervals of the lunar phases: and there is to face P. 232

Plate 5



Luke Howard. invenit. Lowry sc

a tendency in the curves to return about the time of the phases to the mean line, commonly in order to cross it, and assume an opposite deviation; from which they often return within the week, as before. The change of the mean of the period, again, from a lower to a higher place in the scale, or *vice versa*, according to the season, is effected not so much by the gradual elevation or depression of the Temperature through the period, as by sudden bold sweeps of the curve in particular parts of it. Numbers 7 and 8 for the summer, and 10 and 12 for the autumn, approach to the former, or gradual mode of variation; while 5 and 11 may be cited as instances of a more rapid change of level. In each of the latter three periods, the curve assumes a decided tendency upward or downward, two or three days before the Full Moon, which it preserves through the following week, the warm or cold weather coming in at once by means of this movement. No. 3 and 5 present almost equally bold upward sweeps, having their *nodes* (if I may be allowed so to use the term) about New Moon; but these elevations do not hold their level afterwards.

If we contemplate the cold periods, No. 2, 3, and 4 in connexion, their general character, notwithstanding a large depression in each about the middle, will appear to be that of a rising Temperature by the influence of the *New*, and a falling one by that of *Full* Moon.

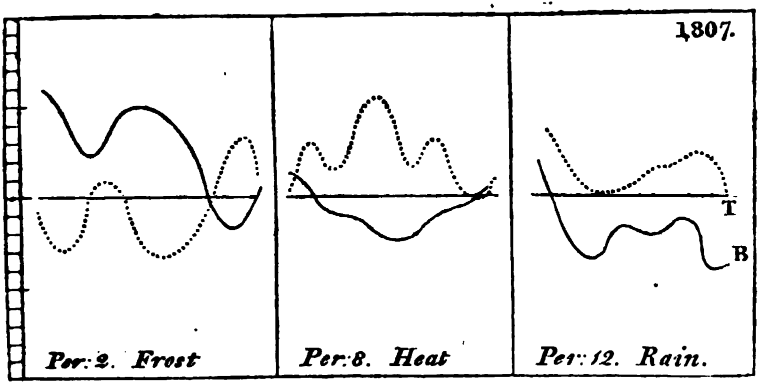
In the periods from No. 5 to 8, of increasing Temperature, the near agreement in the time of beginning their most considerable elevations above the mean will scarcely be thought accidental. Period 5 takes its departure from the mean of 4 and closes very little above that of 6: this period has hence in effect five points of intersection with the line; which limit four distinct and contrary oscillations of Temperature, each performed in the space between two Lunar phases.

Lastly, in the three periods of descending Temperature, No. 11, 12 and 13, there are six or seven depressions nearly coincident with each other in time. I can scarcely omit to notice here the beautiful manner in which the curve of the mean Temperature (like that of the Barometer) sometimes proceeds in gradually increasing and decreasing oscillations, about a general level or line of direction, which it has assumed for a few days. Period 8 has two examples of this, one below the mean line, the other above it: by the latter the Temperature was carried, on the 22d of the Seventh Month, to the higher extreme of the year: and No. 11 presents a third, in the course of which three weeks of fine weather (which had been attended with an appropriate variation of both instruments) broke up, and gave place to the Autumnal rains.

The Barometrical variation will be found, on comparing together the two systems of curves, to be mostly in opposition to, but at times in conjunction with, the Temperature. In the early cold periods, and in the fine weather of summer, *opposition* will be found predominant; but in the decline of the year, when the atmosphere is losing both heat and water, the two curves often vary in the same direction.

Fig. 12 contains specimens of Barometrical and Thermometrical curves in each state of relation. In the first pair, the season being frosty (the time, the first ten days of 1807) the Barometer ranges high, yet descends a little, to meet an elevation of the Temperature above the mean of the period in the first week. After this, with a South wind, the two curves suddenly change places, marking an intermission of short continuance in the frost.

Fig. 12.



In dry hot weather we have the reverse of this arrangement: the Temperature forming oscillations above the mean, and the Barometer an opposite curve below it. Such is the character of the variation for the space of eight days following the 18th of the Seventh Month, chiefly included in period 8, and represented by the second pair.

The third pair is a specimen of the agreement in direction of the two curves, when the season is tending to rain. Here we have the Temperature above the mean, but descending; and the Barometer below it, descending also: a slight opposite movement being felt, at the same time by both instruments. This specimen is a part of Period 12, beginning the 1st of the Eleventh Month, and is by no means the most interesting example which my set of curves, as far as already made out, would furnish. This week furnished about an inch of water, to the rain-guage at forty-three feet elevation.

We have next to enquire into the connexion of these variations with the changes of wind, and distribution of rain in each period; which will be found strikingly unequal, and quite as much influenced in this year by the Moon's positions, as is the variation of the Barometer.

I shall first put down the Rain for this Solar year, in a form calculated to shew its relation both to the phases and periods. In dividing it, the day of the *phase* was considered as the *middle point* of a *week's* rain; and where any quantity fell on a day equidistant between two phases, it was referred to that with the lowest Barometer.

Period.	Last Qr.	New M.	First Qr.	Full M.	Last Qr.
1.	....	....	....	0·04	0·05 in.
2.	....	....	0·27	0·21	....
3.	0·39	0·31	....	0·24	0·01
4.	0·01	0·25	0·01	0·02	....
5.	0·37	....	0·17	....	0·04
6.	....	1·57	0·79	....	....
7.	0·82	1·22	....	....	....
8.	....	....	0·05	....	0·01
9.	0·25	0·08	1·09	0·01	0·03
10.	0·28	0.05	0·65	....	0·41
11.	0·41	0·13	00·2	....	0·52
12.	0·46	0·21	1·42	0·11	0·49
13.	0·64	....	0·16	....	....
Totals	3·63	3·82	4·63	0·63	1·56 3·63
					5·19
Add one-third for the level, the guage being at an elevation of 43 feet		1·27	1·54	0·21	1·73
Rain at the ground		5·09	6·17	0·84	6·92

Total for the Solar year....19·02 inches

The great and almost positive *dryness* of the *Full Moon week* during this year, is thus rendered equally conspicuous with the elevations of the B rometrical curve by which it was accompanied.

The immediate cause of both will presently be shown to be, *the prevalence of Northerly winds during this part of the Lunar revolution.*

A space of eight days being taken out of each period, for the New and Full Moon respectively, with the phase as nearly as could be in the middle of the time, the daily observations on the wind were found to number as follows:

Winds.	New M.	Full M.
N and NE	13	20
N-West	7	21
West	19	15
S-West	33	17
S and SE	6	4
East	5	11
Totals	83	88

The Northwest, which has been already shewn to be more peculiarly our fair weather wind, appears here thrice under the aspect of the Full, for once under that of New Moon: and the North and Northeast are more frequent in the former, in the proportion of 3 to 2.

On the other hand the New Moon, which exhibits so many depressions of the curve, has about double the number of South west, and a proportion of 3 to 2 of Southeast winds.

The West wind predominates here in the division allotted to the New; and the East, to more than double, in that of the Full Moon. I do not consider this disparity as so much connected with wet and dry as the former between the Northerly and Southerly winds. But so far as it is concerned, the *East* wind appears to have been productive rather of *rain*, as will appear by the following statement, in which a week's observations are taken out, for each quarter, with the phase in the midst.

Winds.	First Qr.	Third Qr.
N and NE	8	21
N-West	9	6
West	20	10
S-West	26	13
S and SE	2	8
E	0	9
Totals	65	67

Here the Third quarter, which is the wettest phase, has thrice the amount of Easterly winds that appears in the First: and only half as much Southwest. But in a very dry year it is not so easy to decide from what quarter we receive the rains, as when the cases of heavy rain are multiplied.

On the whole of this year, a connection between considerable depressions of the Barometer and the more copious rains is sufficiently apparent; although there are large depressions attended with but little rain. For the former, see periods 3, 6, 10, 11, 12, 13: and for the latter, 2, 5. In periods 3, 4, 7 and 9, there are examples of rain connected with a mean height of the Barometer, and a mean Temperature for the season.

The influence of the Moon on the Temperature and density of our local atmosphere, appears therefore, with respect to these more obvious and frequent changes, to be exercised chiefly through the medium of the winds. It is a secondary effect of her varied attraction; which continually tends to change the bearings of the different currents in motion in the great body of the atmosphere; and we are thus successively involved in all their modifications. Not but that there are seasons when the predominant Solar influence is exerted to a degree, which renders these Lunar changes of small consequence: and when in spite of the various aspects of our attendant planet, we are drenched with rain or parched with drought, for months together.*

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* "By what law of Nature is the atmosphere governed? We have not had any rain, generally speaking, since last harvest. (date, Feb. 19, 1777.) Springs have not yet begun to rise, deep wells in general want water, and many ponds are not yet filled: even the surface of the earth is not satisfied." Marshall: Minutes, &c. on Agriculture in the Southern counties.

The same.—"June 23. The spring seed time was moist, but not remarkably wet: the clouds reserved their bounty for May and June. The middle of May was very wet, and so is the middle of June. The last ten days have been, except one, uniformly rainy. Last night, it poured for eight or nine hours: perhaps never more rain fell in so short a time; the ground was never so wet since the deluge!"

The same.—"July 15. From 23d June to the 8th inst. there was scarcely a fair day. The rain set in June 13: it therefore lasted 26 days, with scarcely one fair day intervening. The attendant circumstances were these. The Barometer *hovered about changeable*, and seemed to watch the motions of the wind, which was generally SW. Whenever it veered round to the Northward, the air got heavy; but as soon as it returned to its old station, the Barometer as regularly got back to changeable.

"*The impotence of the Moon was fully proved: she became full, shifted her quarters, and even changed, without the least effect.* The wind alone seemed to rule: for as soon as it was fixed in the North, the rain ceased, and before it had been eight and forty hours there, the weather changed from very cold, for the time of year, to very hot. The change of the wind was preceded by a very heavy squall in the night."

On these facts I would remark as follows. The law by which the atmosphere was on this occasion governed, appears clearly to have been the ordinary law of compensation. A long dry time preceded a long wet one: and the distribution of wet and dry, instead of being comprised within a month, (as is often the case with us,) occupied three whole seasons; the dry extending from the Autumnal Equinox

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The variation of 1807, like that of 1798, appears to be in great measure peculiar to the year in which it is found, and it gives place in the succeeding years to a different set of combinations.

The elevations of the *Barometer* about the Full Moon, for instance, which appear in 1807, are found in much less proportion in the next year; and in 1809 they mostly yield to depressions in the same place, the New Moon acquiring in the mean time larger and more numerous elevations.

With regard to *Temperature*, again, the different positions afford different results as the years proceed. In 1807, the average of the mean Temperature taken upon each day through the twelve periods, exhibits a very regular appearance. The Temperature thus obtained being laid down in a curve upon the mean of the whole, it is found to descend below the mean line, in the intervals between Last Quarter and New Moon, and First Quarter and Full Moon respectively, the depressions being carried a little beyond the latter phases: it then rises more abruptly than it fell, and the elevations thus formed in the alternate intervals go off before the arrival of the Quarters. But in the two following years, the parts occupied by these elevations were found by the same method to be passing

to the Vernal; the wet from the latter to near the point of highest temperature, a month after the Summer solstice: when the Southerly current suddenly shifted its range, and we were again placed in the dry air returning from the Northward; which, together with a clear atmosphere above, brought on a free radiation and warm weather. "The impotence of the Moon" during the rains, appears to have been a consequence of the absolute controul of the Sun over these currents through the season.

off into depressions, and those occupied by the depressions first rising to the mean line, and then becoming elevations.

The mean Temperature of these respective intervals for 1807. taken at equal distances and with a clear day allowed after each phase, were found as follows:

Mean Temp. from Last Quarter to New Moon 47.04°
New Moon to First Quarter 49.66°
First Quarter to Full Moon 47.67°
Full Moon to Last Quarter 49.78°

The *proportions*, only, of the rise and fall would have been somewhat different, had the Temperature been taken strictly from phase to phase. The Temperature of our atmosphere during this year was therefore alternately elevated and depressed to the amount of at least *two degrees* in each Lunar week, by some cause connected with the Moon's positions: which yet did not operate precisely in the same way in the following year. Indeed the curve of the Lunar mean Temperature for 1809, obtained in the manner before mentioned, is in its general appearance a contrast to that of 1807.

The Full Moon week also loses in 1808, its *dry* character; which is not immediately taken up by another phase: it exhibits in this year about 4 inches of rain; and rather more in 1809. The *wet* phase in 1808 is the First Quarter; and it is so again, though with a smaller excess over the other quarters, in 1809; the Last Quarter becomes drier in proportion.

The relative changes in the direction of the prevailing winds, in each part of the Lunar period, for these two years, have been as yet but imperfectly examined.

A great depression of the Barometer appears in 1807, in the period No. 2, which goes off with a remarkable upward sweep of the curve, about the time of Full Moon. There are nearly parallel depressions, equally conspicuous, in the two following years. In 1808, the sudden rise after the crisis occurs 20 days earlier in the year, and with a like relation to the First Quarter: in 1809, it is about 20 days later, and attached in like manner to the time of New Moon. It is remarkable that in each case the full pressure was restored chiefly by means of *South-west* winds, and without any excess of rain, or storm of wind. Such periodical large movements, with the backward order of the phases in this instance, deserve notice; as being probably connected with extensive changes in our Northern atmosphere; perhaps with the shifting, through several degrees of longitude and latitude, of the range of the larger currents, which depend on the Sun's progress in North or South declination.

Being curious to know whether the difference of the Lunar positions, which occasioned so unequal a distribution of the rain, had a similar effect on the *Evaporation*, I took out weekly portions from my Tables, with the phase in the midst of the time, as before for the rain; and found that even in 1807 and the latter part of 1806, the amount of Evaporation for 12 periods under the Full Moon was 9.84 in. the same under the Last Quarter being 9.55 inches. And having formed an average, for the three years of which I have more particularly treated, the amounts raised in equal times, under each phase, were found so nearly alike, as to render the conclusion inevitable, *that the Lunar* *positions, however they may affect the distribution of the rain, produce no sensible difference in that of the Evaporation.*

This process is nearly a continuous one through the year: it is an effect of the temperature of the water, modified by the greater or less velocity of the wind agitating its surface, and diffusing the vapour produced. But rain is an occasional process; and appears to require a more complex arrangement of causes, at least for its prevalence in a given district. We have here to take into account the Temperature and Electricity, absolute and relative, of both the earth and atmosphere; the relative temperature, moisture, and perhaps electricity of different simultaneous currents; the direction of these with regard to neighbouring seas and continents, and to the slope or exposure of the district itself; and lastly, as it seems, the Moon's influence.

I have now to give some account of this influence as exercised on our atmosphere, *2ndly, according to the Moon's place in North or South declination.*

The inquiry into this part of the subject was first proposed to me by Silvanus Bevan, junior, of London, lately deceased. What I shall offer upon it is principally derived from his minute and accurate examination of the data furnished by my Register. Other parts of the work had been before improved by his assistance; and the diagrams were nearly all finally prepared by his hand for the engraver. Had his life been prolonged, I should not have been satisfied to conceal the obligations thus contracted to my affectionate friend and zealous coadjutor; on whom a large natural capacity matured by study and practice, had conferred great correctness of taste and judgment; and (what is yet a more pleasing reflection) his mental qualities were enhanced by the faith of a Christian, by an unblemished conduct and polished manners. His bodily constitution was however so feeble, that the utmost care over it sufficed not quite to middle age; and at the approach of the late winter, a pulmonary complaint, before habitual, became exacerbated to a degree which speedily brought on his dissolution.

The object of this inquiry, which my deceased friend had left imperfect, may be thus stated. Since it is evident that the Moon exerts an influence, through the medium of the winds if not also directly, on the atmosphere of these latitudes, the effects ought to be felt in a greater degree when that planet, by acquiring her highest North declination, becomes at her meridian altitude almost vertical to us, than when, being South of the Equator, she is vertical to a distant latitude in the other hemisphere. To ascertain this, it was necessary to submit some part of the observations, in my first volume, to the like test as in the case of the Lunar phases; by comparing, in detail, particular results with a general average. The years 1807 and 1816, the one the driest, the other the wettest of a series of 18 years, were selected as first entitled to notice; and the results have proved of greater value than either of us had anticipated. It is evident, from these two years alone, that not only the variable pressure of our atmosphere, but its mean temperature likewise, and the periods of the deposition of rain, are modified in those latitudes by the Moon's declination. Thus, another important feature is added to this already complex subject; and the same anomaly, arising from the combination of the different causes producing the phenomena, is found here also—that particular results appear in opposition to a general rule; which rule is yet in the end satisfactorily established by general averages.

Barometrical Averages, in Half-periods of Lunar declination: from 29–30 Dec. 1806 to 20 Dec. 1807, or 355½ days: Mean of the whole 29·816 inches.

Per.	Days	Moon	South	Days	Moon	North	Days	Mean of both
1	14	30·178	+221	13½	29·732	—225	27½	29·957 in.
2	14	29·676	—089	13	29·860	+095	27	29·765
3	14	29·928	+018	13½	29·892	—018	27½	29·910
4	14	29·907	+105	13½	29·694	—108	27½	29·802
5	13½	29·970	+246	14	29·486	—238	27½	29·724
6	13½	29·927	+044	13½	29·837	—046	27	29·883
7	13½	29·972	+026	14	29·921	—025	27½	29·946
8	13½	29·789	+022	13½	29·744	—023	27	29·767
9	14	29·847	+009	13½	29·866	—010	27½	29·856
10	13½	29·814	+056	14	29·705	—053	27½	29·758
11	13½	30·005	+136	14	29·738	—131	27½	29·869
12	13	29·486	—036	14	29·556	+034	27	29·522
13	13½	29·648	—206	14	30·042	+188	27½	29·854
Mean		29·857	Mean		29·775	Mean		29·816

Note. The spaces taken are those during which the Moon was successively in N, and S declination: the fourth and seventh columns shew the quantities by which the average height of the Barometer for those spaces fell short of, or exceeded the average of the period, as given in the last column.

Averages of the Barometer and Thermometer in Quarter-periods of Lunar declination, **from the 3d of 1st Mo (Jan.) to the 23d of 12th Mo. (Dec.) 1807, or 355 days.**

Mean Temperature 48·58°.

Full South Declination					*Mean Declin.* Moongoing N			
Per.	Days	Barometer.		Therm.	Days	Barometer.		Therm.
1	7	30·203	+·389	33·36	7	29·938	+·124	34·69°
2	7	29.434	—·380	33·25	7	29·667	—·127	43·32
3	7	30·161	+·347	35·03	7	29·810	—·004	32·14
4	7	29·691	—·123	37·93	7	29·997	+·183	37·54
5	7	30·016	+·202	54·50	7	29·629	—·185	60·36
6	7	29·943	+·129	60·36	6	29·721	—·093	51·88
7	7	30·024	+·210	58·61	6	29·866	+·052	61·92
8	7	29·844	+·030	66·32	7	29·708	—·106	69·32
9	7	29·792	—·022	65·75	6	29·887	+·073	79·29
10	7	29·759	—·055	54·07	6	29·903	+·089	45·83
11	7	29·786	+·172	58·46	7	30·071	+·257	58·39
12	6	29·510	—·304	44·21	7	29·391	—·423	39·69
13	7	29·808	—·006	32·39	6	29·661	—·153	33·54
	90	29·852	Means	48·57	86	29·789	Means	49·57

N. B. The spaces taken are as nearly as possible those which have the Moon's greatest N or S declination, or her position on the Equator in their middle. The differences of the Barometer refer in this Table to the general average only, or 29·814 in.

Mean of the Barometer 29·814 in.

Full North Declination.				*Mean Declin.* Moon going S.			
Days	Barometer.		Therm.	Days	Barometer.		Therm.
7	29·375	—·439	36·39	6	30·392	+·422	33·50°
7	29·906	+·092	38·93	6	29·699	—·115	39·83
7	29·789	—·025	34·96	7	30·102	+·292	38·04
7	29·501	—·313	48·82	6	29·704	—·107	38·33
7	29·388	—·426	52·25	7	30·051	+·137	54·36
7	29·822	+·008	57·93	7	29·954	+·140	58·64
7	29·844	+·030	58·25	7	29·945	+·131	61·14
7	29.728	—·086	65·79	7	29·844	+·030	62·86
7	29·806	—·008	57·43	7	29·929	+·115	62·07
7	29·714	—·100	55·04	7	29·740	—·074	53·11
7	29·667	—·147	53·32	7	29·598	—·216	45·57
7	29·743	—·071	37·54	7	29·316	—·498	35·39
7	30·125	+·311	36·04	7	30·202	+·388	32·18
91	29·724	Means	48·66	88	29·881	Means	47·53

In the Table, page 245, the Barometrical observations for 355½ days of 1807 are reduced to averages, on half-periods of 13, 13½ or 14 days; during which the Moon was in North or South declination. These are contrasted, in each case, with the mean of the whole period. In *ten* out of thirteen cases, the Barometer averaged above the mean, while the Moon was in South declination; and below it, while she was in North declinatlon: *three* exceptions appear, which belong to the *winter*.

The total results are these,

On 177½ days with the Moon South,	29·857
On 178 days with the Moon North	29·775
Mean of the 355½ days	29·816 in.
Elevation for her position South of the Equator	·041
Depression for her position North .	·041

A similar calculation of averages having been made for 356 days, from the 24th of 12th Mo. 1815, to the 13th of the same, 1816, but without descending to half-days in dividing the periods, the results are as follows:

On 180 days, Moon South, . . .	29·765
On 176 days, Moon North, . . .	29·704
Mean of the 356 days, ...	29·735 in.
Elevation for her position South .	·030
Depression for her position North .	·031

The Barometer having stood lower and ranged less in this year than in 1807, the variation for declination is less in amount accordingly. The cases which appear against the general rule, or in which the Barometer averages *higher* under a *North* declination, form in this year a majority, occurring in seven out of thirteen periods; and of these seven, *five* clearly belong to the *summer* half-year.

In the Table, page 246–7, the mean Temperature is taken along with the mean height of the Barometer for 1807, and each period is divided into *quarters.* The intention of this was, to ascertain separately the respective effects of a full South, of a full North, and of each kind of mean declination. In making up the results, the *Rain* for each of these quarters, ascertained by a separate calculation and corrected for the elevation of the guage, is likewise inserted. The results are,

1. For the quarter period in which the Moon was in Full South declination: Barometer 29·852
being above the general mean . . . ·038 in.
Thermometer. . . . . 48·57°,
being below the general mean ·01°.
Rain 3·56 inches.

2. For the quarter period in which the Moon was coming North across the Equator, Bar. 29·789
below the general mean . . . . ·025 in.
Thermometer . . . . 49·57°,
above the general mean . 1·00°.
Rain 4·96 inches.

3. For the quarter-period in which the Moon was in Full North declination, Barometer 29·724
below the general mean . . . . . ·090 in.
Thermometer . . . . 48·66°,
above the general mean . ·08°.
Rain 6·67 inches.

4. For the quarter-period in which the Moon was going South across the Equator, Barom. 29·881
above the general mean . . . . ·067 in.
Thermometer . . . . 47·53°
below the general mean · 1·05°
Rain 3·72 inches.

Having constructed a similar Table for a space of 355 days, beginning the 28th of the 12th Mo. 1815, and ending the 17th of the same, 1816, I found the results as follows; the general mean of the Barometer being 29·723 inches; of the Thermometer 47·09°; the Rain taken at the level of the ground.

1st Quarter-period, Barometer 29·797
above the general mean . . . ·074 in.
Thermometer . . . 46·14°,
below the general mean 0·95°.
Rain 6·65 inches.

2d Quarter-period, Barometer 29·793
above the general mean . . - ·070 in.
Thermometer . . . 48·73°,
above the general mean 1·64°.
Rain 8·21 inches.

3d Quarter-period, Barometer 29·559
below the general mean . . . ·164 in.
Thermometer . . . 47·00°
below the general mean 0·09°
Rain 9·99 inches.

4th Quarter-period, Barometer 29·678
below the general mean . . . . 0·55 in.
Thermometer . . . 46·51°
below the general mean 0·58°
Rain 5·49 inches.

Summary of the effects in these two years.

1. With the Moon Full South.

	1807	1816
Barometer	above mean falling	above mean, rising.
Temperature	about mean	at lowest average.
Rain	the minimum quantity	near the minimum quantity.

2. With the Moon coming North.

	1807	1816
Barometer	below mean	at highest average.
Temperature	at highest average	at highest average.
Rain	much increased	much increased.

3. With the Moon full North.

	1807	1816
Barometer	at lowest average	at lowest average.
Temperature	about mean, falling	about mean.
Rain	the maximum quantity	the maximum quantity.

4. With the Moon going South.

	1807	1816
Barometer	at highest average	below mean rising.
Temperature	at lowest average	below mean.
Rain	nearly at the minimum	the minimum quantity.

The most considerable and striking effect of the Moon's positions in declination here exhibited, is certainly that of the unequal distribution of the *Rain*: which I shall therefore first notice.

It appears that, while the Moon is far South of the Equator, there falls but a moderate quantity of rain with us; that, while she is crossing the Equator towards these latitudes, our rain increases; that the greatest depth of rain falls, with us, in the week in which she is in Full North declination, or most nearly vertical to these latitudes; and that during her return over the Equator to the South, the rain is reduced to its minimum quantity. *And this distribution obtains in very nearly the same proportions both in an extremely dry, and in an extremely wet season.*

The next point to be attended to is the Temperature, in which the two years exhibit (in this respect,) some striking coincidences.

In both years, the Temperature is at its highest average (for the period,) while the Moon is coming North over the Equator. During her continuance in North declination, the temperature in both passes the mean of the period, descending. In the *dry* year, it attains its lowest average while she is proceeding South again: but in the *wet* year, this takes place in the following week, or while she is in full South declination.

I have already exhibited for the year 1807, an unequal distribution of rain, as well as a periodical variation of Temperature, connected with the Moon's *phases*. It will be proper for the reader's satisfaction to recur to these, and to shew that both in 1807 and 1816, the effects which I have attributed to the Moon's position in declination, are distinct from those before shewn to arise from her change of place in revolution.

The Moon was in her Third or Last quarter on the morning of the first day of 1807; she returned to the same phase, after having made twelve revolutions in her orbit, early in the morning of the 22d of the Twelfth month of that year.

There was a New Moon on the afternoon of the 30th of 12th Mo. 1815; and again, after 12 revolutions, on the 18th of the same month 1816.

The reader will find, on comparing these intervals of time with those taken for the declination, that *thirteen* periods of the latter nearly correspond with twelve revolutions; consequently the Moon must have presented every variety of phase, during these spaces, in conjunction with any given degree of North or South declination; and every variety of the latter together with any given phase: a state of things which effectually precludes us from ascribing to the one, any variation presented, *upon the whole of a nearly coincident space of time,* by the other.

The diminution of the average rain, for the week of Full South declination, was therefore, in 1807, independent of the dryness before attributed to the influence of the Full Moon in that year; which was a still more striking phenomenon. Let us see how the case stood, in this respect, in 1816.

Having divided the rain for this year also, according to the phases *about*, and *between* which it fell, and likewise computed the mean Temperature for each of the spaces (which are here denominated weeks) the results are as follow:

In 1816,

For the week *about* New Moon,
Rain 6·11 in. Temp. 47·10°

For the week *about* First Quarter,
Rain 10·10 in. Temp. 46·60°

For the week *about* Full Moon,
Rain 9·13 in. Temp. 47·17°

For the week *about* Last Quarter,
Rain 5·51 in. Temp. 48·39°

Total 30·85 in. Mean 47·31°

For the week *after* New Moon,
Rain 5·21 in. Temp. 46·85°

For the week *after* First Quarter,
Rain 12·49 in. Temp. 46·88°

For the week *after* Full Moon,
Rain 7·41 in. Temp. 47·78°

For the week *after* Last Quarter,
Rain 4·20 in. Temp. 47·75°

Total 29·31 Mean 47·31°

The Full Moon week in 1816, instead of being distinguished for dryness, as in 1807, was excessively wet: the greatest depth of rain, however, fell in the space intervening between First quarter and Full Moon, and the *driest* part of the space included in each Lunar revolution was *in the opposite part of the orbit,* between the Last quarter and New Moon. The reader has only to turn over the Tables, from 114 to 126 inclusive, in the First volume, to be convinced of the fact in each instance.* With the exception of the week following the Summer solstice, in which there fell heavy rain before and after New Moon, the weight of the rain, this year, lies, in a very remarkable manner, within and about the third week of each period, or the space above mentioned; until we come to the latter part of the Eleventh Month and beginning of the Twelfth; when this space suddenly becomes *dry,* and that following the next Last Quarter becomes *wet.* It is observable, though I do not pretend to establish a connexion between the phenomena, that a Solar and a Lunar Eclipse are included in this period, which is so conspicuously dry in this very wet year, the rain being only half the average quantity of the season.

I have remarked that the Lunar orbit, in 1816, appears to have had a wet and a dry side, as it regarded the Moon's influence on the rain of our climate. It appears likewise from the preceding statement, that the Mean Temperature, taken about the phases, was highest for the Last quarter and lowest for the opposite part of the orbit, or First quarter, passing through a mean state for the intermediate phases, of New and Full Moon. Thus the *cold* aspect of our attendant planet was, in this year, also the *wet* one; and the same arrangement that brought more warmth, brought also comparative dryness. And this, as in the very dry year of 1807, subject to a distinct and independent effect produced by the Moon's declination; to the consideration of which subject we may now return.

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* In Table 123, the marks Full M. and 1st Q. have been accidentally transposed.

In order to place in a more striking light the effect of the Moon's *declination* on the *Barometer*, as well as to shew the agreements and differences in this respect, of a very dry and a very wet year, I have given, in Plate 6, four periods of 1807, and as many of 1816, taken in each case from the winter and spring; in which seasons these effects are the most conspicuous. These curves represent the movements of the Barometer from the day of the Moon's crossing the Equator, going South, to that of her return in the same direction to the same position. The regular curve, which accompanies them in each figure, represents the Moon's course in declination, the horizontal line being the Equator. In the *upper* figure, the curves are constructed from the *medium* height of the Barometer for each day, each of them having its mean point in the horizontal line. Consequently the reader, knowing the mean of the period, with the time of its beginning (both of which are given below), and availing himself of the help of an Ephemeris, for the successive times of the extreme South and North declination, &c. may verify for himself, by the Tables from 2 to 6 inclusive (vol. 1.), the accuracy of these delineations; the regular appearance of which, in some parts, may seem not unreasonably to require proof by measurement. Yet they are the result of observations, made without the remotest conception of their being ever applied to this standard, and in a manner which I cannot but consider, now, as imperfect.

The *lower*, or second set of curves, give the variations of the Barometer at their full extent, as recorded on the face of the clock, of which I have already given an account in the Introduction to this work (vol. I. xiii.), and in consequence of their shewing all the smaller variations, which are sunk and lost in the curves constructed from medium heights, their general appearance is very different from the former.

These curves will be found to agree nearly, but not exactly, with the observations in the Tables from 114 to 117 inclusive: the latter having been obtained not from the clock, but from a Barometer in the ordinary way.

In the third or *lowest* figure, the four sets for each year are respectively reduced to a mean curve, which is adapted to a common mean line: and a medium curve, passing between these two, exhibits, finally, the total or average effect of the declination on the Barometer, for the whole of the space taken for this examination.

Time of beginning, and mean height of the Barometer, (represented by the horizontal line), for each of the curves in Plate 6.

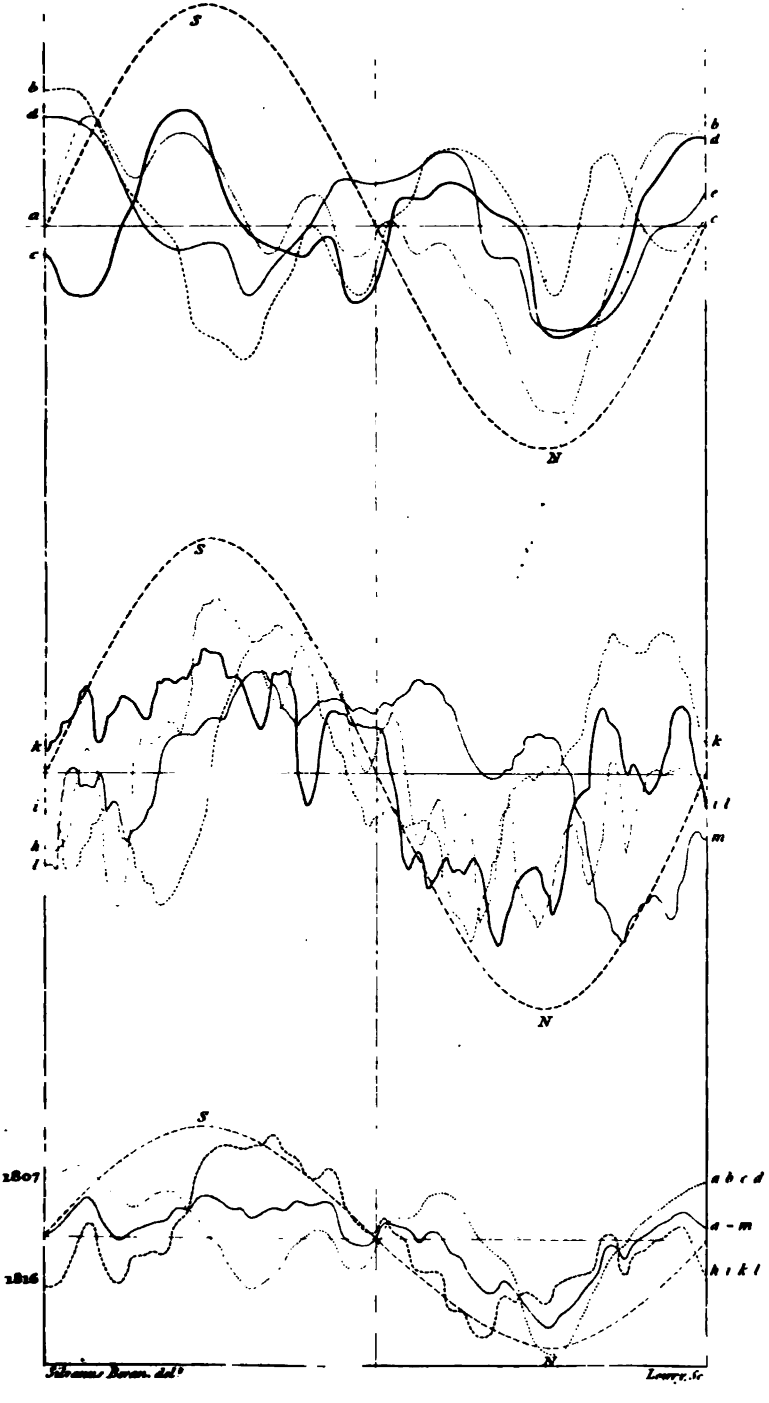
For 1807,

Curve *a*—*b*	begins 30—31 of 12 Mo. 1806;	mean line at	29.97 in.
b—*c*	26—27 of 1 Mo. 1807;		29.76 in.
c—*d*	23 of 2 Mo. 1807;		29.92 in.
d—*e*	23 of 3 Mo. 1807;		29.79 in.

For 1816,

Curve *h*—*i*	23—24 of 12 Mo. 1815;	29.64 in.
i—*k*	19—20 of 1 Mo. 1816;	29.66 in.
k—*l*	16 of 2 Mo. 1816;	29.64 in.
l—*m*	15 of 3 Mo. 1816;	29.79 in.

Barom: 1807 & 1816, in periods of Lunar declination.



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For the whole,

Curve *a*, *b*, *c*, *d*, Mean of 4 periods of declination, beginning 30 of 12 Mo. 1806, ending 19 of 4 Mo. 1807, ...	.... 29.86 in.
Curve *h*, *i*, *k*, *l*, Mean of 4 periods of declination, beginning 23 of 12 Mo. 1815, ending 11 of 4 Mo. 1816, ...	.... 29.68 in.
Curve *a*—*m*. Mean of the above 8 periods,	.... 29.77 in.

It will be convenient to begin the examination of these curves with the last, or general one, which, it will be recollected, gives the daily mean heights of the Barometer through a period of declination, upon averages of eight days each; the observations taken in seasons remote from each other, and under all the variety of weather to which the winter and spring months are incident: consequently, in a manner calculated to secure the fairest results.

The general appearance of the curve *a*—*m* confirms the position already deduced from calculations on a larger space. It is, for the most part, above the general mean during the Moon's continuance in South declination, and below it during her North declination. The depression for the latter is, moreover, the most regular part of the whole variation; its crisis coinciding very nearly with the time of the Moon's beginning to return South, and the times of its departing from and returning to the mean being symmetrical. In this part also, the respective curves of the dry and the wet year present appearances the most nearly alike; and it is observable, that in the dry one the curve descends lowest.

The curve also runs highest in the wet year, on the South side of the period; when we find the greatest difference, and indeed opposition, to prevail. While the Moon proceeds towards the South from the Equator, the Barometer of the dry year, which had risen at the going off of the Northerly depression, falls; and that of the wet year, which had continued, as it were, struggling below the mean, rises. Two or three days after the Moon has begun to come back from the South, each of the curves again changes its direction; that of the wet year now enters on a fall of ten days, which carries it across the mean to its lowest point for the whole period: that of the dry year rises for nearly an equal space, attaining a moderate elevation above the mean; from which it passes into the Northerly depression. Thus the wet year has the Barometer at a high level for a week only, while the Moon is approaching the Equator from the South, and the remainder of the period may be said to be nearly occupied by depressions: and the dry year is subject to a considerable depression, during the week of Full North declination; the rest of the period being chiefly occupied by a mean or elevated Barometer. And supposing a rule to be found, for the periodical return of such extreme wet and dry years, we have here (so far as regards the winter months,) a pretty certain method of anticipating the time of the occurrence of storms, in the fair season, and of fair and moderate intervals, in the wet and stormy one. Such are the mean movements of the Barometer, in these two seasons so opposite in their character, for the winter and early part of spring. It was not found expedient to introduce a greater number of curves into the figures, or to attempt, in this place, the solution of more complicated appearances. We may now therefore advert to these curves singly, or as groups, in order to inquire into the attendant winds, and other circum tances.

The elevations belonging to the week in which the Moon was crossing the Equator, southward, in 1807, constituting the extreme parts of the four curves, were accompanied by winds from the *South-west, West,* and *North-west.* There appears but one observation of NE, and two of E, in this interval; and not one of a South wind.

The movements, in 1816, for this space, in which depressions predominate, had winds from the *South-east, South-west,* and *West.* Three or four cases only of a Northerly wind appear, along with the great elevation in curve *i—k,* continued in *k—l.* This was at the going off of the severe frost of that season, in which the Thermometer stood a whole night 5 below zero. The crisis of the Barometrical depression, on this occasion, fell on the morning of the 7th of Second month, which is the date of the lowest point of the curve *i—k*; and the same winds which brought that intense cold, produced also the great rise of the Barometer.

For the week of Full South declination we have, in 1807, for the most part *North, North-east,* and *West* winds: the depression at this time in the curve *b—c* was effected by South, South-west, and West winds. In 1816, we have for this space an alternate play of winds; the *South, South-west,* and *North-east* predominating in *h—i* and *k—l,* and the *North, North-east, East,* and *South-east* in *i—k* and *l—m,* with appropriate movements in the curves. The curve *i—k* exhibits a fine upward sweep of five days under NE and N winds, after being three days depressed by the South-east: the crisis of these two movements will be found in Table 115, at the 24—25 of First Month. Table 114 will also furnish interesting particulars of the curious sudden depression, immediately preceding the great rise which distinguishes this portion of the curve *h—i*.

We come next to the week of mean declination, the Moon going Northward, in which the two movements again cross each other. The winds here are, in 1807, the *South-west, West, North, North-east,* and *North-west,* without any South or South-east; and in 1816, *the South-west, South, West, North-west,* and *South-east*; without any North or North-east, till we come towards the close of the series. Hence the curve *l—m* presents an exception; being kept up for five or six days, where the others fall, by North-east and East winds, and at length falling (out of course and where the others rise) by the progress of the wind to South-east and so round to the Westward. This exception, which followed the Vernal Equinox (see Tab. 117,) extended also to the weather, there being hereabouts seventeen days in succession free from rain, the longest *dry* space in this year!

If we now turn back to the curves for 1807, we shall find in *a—b* a parallel exception. This curve, in crossing the mean line, *descends* on the whole, from the 11th to the 16th of the First month, with a fine movement of decreasing undulation, and with the winds as follow; W, SW, NW, W, SW, NW. It then enters upon the regular depression for North declination: for the particulars attending this and the preceding movement, the reader may consult Table 3 in the First volume. It is probable these movements will be found, hereafter, to be necessary compensations in an extensive system.

There remain now to be considered only the depressions in the week of Full North declination. In 1807 these are very regular, and their crisis agrees nearly with the time of the Moon's being farthest North: in

1816, on the contrary, we see them accelerated or retarded; so that the crisis, where it can be defined, lies considerably on one side or the other of this point. The difference would have been still more perceptible, had the curves of 1816 been formed, like the other, from *medium* observations.

These depressions are not necessarily attended with gales of wind or heavy rain, at the place of observation. The crisis of that in the curve *b*—*c* was, however, connected in our district with a very severe gale from the NE, with snow and electrical discharges from the clouds; as that of the curve *a*—*b* probably was, with a storm at a considerable distance, in Devonshire, which appears by the accounts in the papers to have done much damage. See the dates, First Month 21, Second Month 17, Third Month 17, and Fourth Month 13, in the Tables from 3 to 6 inclusive.

In 1816, however, the desultory movements of the Barometer in the lower part of the scale, in this space, did not in many instances baulk the observer's expectation, and there occur in the Tables from 114 to 117 inclusive, all the varieties of foul weather, in connexion with them; the particulars of which it is not needful here to point out.

With regard to the *direction* of the winds in this space; in the four periods of 1807, the South-west predominates, and next to it are the North-east and North-west, the South-east again absent: but in 1816, the winds are a perfect mixture, there being no point without at least two observations, and the South-west only considerably exceeding in number.

The fairest mode of comparing the winds for these spaces is, however, upon the whole year. I have accordingly taken out the observations for these two years, in spaces answering to those of the Table of

Quarter-periods of declination for 1807, page 246—7; and to those of a similar Table formed for 1816, the results of which are given with the former.

Proportions of the different Classes of Winds, in Quarter-periods of Lunar declination, from the 3d of the 1st Mo. (Jan.) to the 23d of the 12th Mo. (Dec.) 1807; being 355 days, or 13 periods of declination.

	Full South Declination.						*Mean Declin.* Moon going N.					
Per.	Days	N—E	E—S	S—W	W—N	Var.	Days	N—E	E—S	S—W	W—N	Var.
1	7	2		1	4		7		1	2	4	
2	7	1		2	4		7			4	3	
3	7	5			1	1	7	5			2	
4	7	6				1	7	2		4		1
5	7		2	3	1	1	7	1	4			2
6	7	3	2	1		1	6	1	2	1	2	
7	7				7		6	1			3	2
8	7			4	3		7			4	1	2
9	7	1	2		4		6		5		1	
10	7			1	6		6	4			2	
11	7			3	4		7			5	1	1
12	6	1		3	1	1	7		1	3	3	
13	7	2		1	3	1	6	1		1	4	
	90	21	6	19	38	6	86	15	13	24	26	8

N. B. The spaces taken are, as nearly as possible, those which have the Moon's greatest N or S declination, or her position on the Equator in their middle. The Winds are taken from the Tables in Vol. 1.

Full North Declination.						*Mean Declin.* Moon going S.					
Days	N—E	E—S	S—W	W—N	Var.	Days	N—E	E—S	S—W	W—N	Var.
7	1	1	2	2	1	6			2	4	
7	1		3		3	6			2	4	
7	3		1	3		7	2	2	1	1	1
7	1		4		2	6	4	1			1
7			4		3	7	1		5		1
7			2	2	3	7			4	2	1
7	2	1	1	2	1	7	2	1	2	1	1
7			6		1	7	1		3	2	1
7		1	3	3		7			1	6	
7	1		4	1	1	7		1	3	2	1
7	1		1	3	2	7	1	3	2	1	
7	3			1	3	7		1	4	2	
7				5	2	7		3	1	2	1
91	13	3	31	22	22	88	11	12	30	27	8

Proportions of the different Classes of Winds, in Quarter-periods of Lunar declination, from the 28th of the 12th Mo. (Dec.) 1815, to the 16th of the same, 1816; being 355 days, or 13 periods of declination.

	Full South Declination.						*Mean Declin.* Moon going N.					
Per.	Days	N—E	E—S	S—W	W—N	Var.	Days	N—E	E—S	S—W	W—N	Var.
1	7			5	2		7			4	3	
2	7	5	2				7		2	5		
3	7	1		4	2		7			4	3	
4	7	4	1		2		7	2	5			
5	7	1	2	1	3		7	3	4			
6	7	2	1	1	3		7	4	1	2		
7	7	3	1	2	1		7	3		2	2	
8	7			4	2	1	7		1	3	1	2
9	7			5	1	1	7		2	3	2	
10	6		2	1	3		7			4	3	
11	7	1		4	1	1	7		4	1	1	1
12	7		5	1		1	7	1	2	3		1
13	6	1	3	1	1		7	3		2	2	
	89	18	17	29	21	4	91	16	21	33	17	4

N. B. The spaces taken are, as nearly as possible, those which have the Moon's greatest N or S declination, or her position on the Equator in their middle. The Winds are taken from the Tables in Vol. 1.

Full North Declination.						*Mean Declin.* Moon going S.					
Days	N—E	E—S	S—W	W—N	Var.	Days	N—E	E—S	S—W	W—N	Var.
6		1	3	2		7		3	3	1	
7	4	1	1		1	6	1		3	2	
7	2		4	1		7			4	3	
7	1	3	1	1	1	6	3	1		2	
7		2	1	4		6			4	2	
7	2	2	1	2		7			1	5	1
6	2		1	2	1	7			1	2	4
6			4	1	1	7	1			5	1
7	2			4	1	7	3	2		2	
7	2	1	4			7	3	3	1		
6	1	2	1	1	1	7		1		4	2
7	1		2	2	2	7			3	4	
7		3	3	1		7			2	3	2
87	17	15	26	21	8	88	11	10	22	35	10

Summary of the distribution of the Winds according to the Moon's declination in 1807 and 1816.

	N—E	E—S	S—W	W—N	Var.	Days.
1. With the Moon full South.						
1807	21	6	19	38	6	90
1816	18	17	29	21	4	89
2. With the Moon coming North.						
1807	15	13	24	26	8	86
1816	16	21	33	17	4	91
3. With the Moon full North.						
1807	13	3	31	22	22	91
1816	17	15	26	21	8	87
4. With the Moon going South.						
1807	11	12	30	27	8	88
1816	11	10	22	35	10	88
Totals 1807	60	34	104	113	44	355
Totals 1816	62	63	110	94	26	355

The two classes N—E and S—W are of nearly the same *total amount* in the wet, as in the dry year. The character of a whole year, in this respect, does not appear to be decided by either of them; but rather by the class E—S, which has nearly twice the amount in the wet year, that it exhibits in the dry: and this excess is taken out of the class W—N, and out of the *variable*. In regarding the year as a whole, it is also proper to remark, that a much greater quantity of air undoubtedly passed over us, in all directions, in 1816 than in 1807. The large amount of variable winds, which appears under the Full North declination for

1807, is clearly raised at the expence of the E—S and N—E classes. I am not conscious of having used less care respecting these classes in 1816; and am inclined to believe that, during the fine season of 1807, there prevailed a much larger proportion of variable *Easterly breezes,* than of *winds* from either of these quarters. It seems to be one of the conditions of such a season, that the air of the district shall not hastily travel out of it, nor that of a distant one suddenly invade it. A windy season can hardly fail, at least in some part of it, to be a wet one.

The distribution, as well as the amount, of the N—E is nearly alike in the two years. I shall therefore leave it for the present, to attend to the next in order.

The class E—S, which I have already characterised as the principal *importer* of our rains in Spring and Summer, appears to make its way into this district chiefly while the Moon is approaching from the South. The air being thus vapourized to the degree required for the moderate rains of the season, this wind falls off, in the dry year, during the week of North declination, to a very inconsiderable quantity: but in the wet year, it is reduced to its minimum, only during the return of the Moon to the South.

The class S—W follows nearly the same rule. It increases as the Moon comes North, and decreases as she proceeds South again: but it is more fully manifested, under Northerly declination, in the dry, than in the wet year; continuing nearly undiminished until the Moon is Full South.

Northerly winds are of course more frequent in those seasons when the Southerly fall off. They were at their height, in 1807, in both classes, under Full South declination: the W—N, in this year, came to their minimum under North declination, the N—E not until the following week, when they were only at about half their greatest amount. In 1816, the class W—N appears to have supplied the place of the N—E, while the Moon was going South; falling to half the number in the week of her return Northward, and exhibiting a mean amount in the intermediate weeks.

This account of the Winds, compared with the summary of the effects on the Barometer, Temperature, and Rain, in page 251, may supply us with a key to many of the facts there stated.

A general tendency in the Northern atmosphere to come over us, while the Moon is far South, may be admitted as a cause why the Barometer at this time is above the mean, the Temperature about or below it, and the Rains in small quantity.

As the Moon comes North again, the air returning from the South causes increased temperature: it brings also a great increase of vapour, and the heat evolved during the condensation of this, may possibly be the means of the greater elevation of the mean Temperature at this time, in the wet, than in the dry year. Something must however be attributed, in this case, to the actual translation of more of the tropical air into these latitudes, in a wet season. The increase of the rain at this time, in both seasons, is a necessary consequence of the other arrangements.

Why the Barometer should now be below the mean in the dry, and at its highest average in the wet season, is not equally apparent: but we may further notice its movements in the conclusion.

Under Full North declination, we have the results of the previous introduction of vapour by Southerly winds. In the dry year, the vapour is decomposed in a short space of time, and the attendant gales of wind are single and decided: in the wet, a longer continuance, or a number of repetitions of this process, together with the larger product of rain, indicate the operation of numerous currents from distant regions. In each season, these causes suffice to bring the Barometer to its lowest average, and the Temperature to the mean.

While the Moon is returning to the South, the winds from West to North predominating, in the wet year, tend to raise the Barometer and reduce the Temperature. The latter effect may also be now accelerated by Evaporation, as the rains decrease again. It is remarkable that, in 1807, the Barometer shews the highest average for this week, and the Temperature the lowest, with the smallest proportion of N—E, and nearly the largest of S—W winds.

The course of the varying density of the atmosphere in its relation to the Moon's declination, is pretty fairly represented as to direction, though not as to extent, for the whole of the two years, by the specimen given in the two mean curves, *a, b, c, d*, and *h, i, k, l,* in Plate 6. It will be important, hereafter, to ascertain fully the principles of these two modes of variation; as they appear, more than any other circumstance (the disproportion of the Southeast winds excepted) to mark the difference between a wet and a dry season; and their periodical causes being once known, the return of such seasons may be predicted with some degree of certainty. I consider the scheme which I have given early in this inquiry (page 94) of the varying *mean Temperature* of the years, as calculated in great measure to answer this purpose; it being very clear, that the greatest depth of rain falls in the coldest years, and that the warm years are dry or mean ones. But it will be a great addition to this information; should we be able to prove, from observations now extant, that the Barometer also varies its mean height periodically, from year to year; and that both variations are governed by a periodical succession of the different classes of winds.

I might add to the mass of evidence on this subject some proofs of a peculiar relation between the Moon's *apogee* and *perigee*, and the mean height of the Barometer on the days on which they occur: but I have nothing as yet, so far digested as to be relied on. Indeed the labour of preparing what has now been thrown before the reader, has greatly exceeded my expectations; and being prosecuted with considerable disadvantage, in the midst of other engagements, has delayed rather unreasonably the completion of this part of the work. In publishing, in their present state, so large a proportion of the facts derivable from my observations, I shall undoubtedly throw the whole remainder of them open to the use of others, and may probably be thus anticipated in some important deductions yet to come. But I am not at all jealous of the little merit which attaches to discovery, in a field so rich, and hitherto so little trodden; and shall be well satisfied should others, to whose minds the requisite knowledge of Astronomical relations may be familiar, and their capacity for such enquiries, from a mathematical education, greatly superiour to mine, be willing, after examining these data, and correcting such errors as they may find, to take up the subject, and improve upon my beginnings.

If the Moon's attraction be really the principal cause of those variations in the atmosphere which cannot be traced to the influence of the superiour planet, the mode of operation of this attraction may be very simple, at the same time that, considering the complicated nature of the Lunar orbit, and the perpetual interference of the Sun's varying power, its manifestations in any given temperate climate may prove a very difficult subject to investigate.

On a train of effects, the most part of which are out of the reach of direct observation, we may be permitted, in this part of the work, to hazard a few conjectures.

The surface of the atmosphere is, I think, less elevated, and better defined, than many persons would be led to imagine it. A portion of air, rarefied by means of the air-pump, does indeed exhibit an elasticity, which seems limited only by the imperfection of the instrument. For the most minute residuum still appears to fill the vessel, and to press against it in all directions But it does this at a temperature which, compared with that of the extreme boundaries of the atmosphere, is probably that of the steam in a high-pressure engine to the water in a well. We know that, in ascending in the atmosphere, the temperature is found to decrease with the decreasing density of the air: and even under a vertical sun, between the Tropics, a line of perpetual snow on the mountains, indicates a boundary within our reach, which the heat never has ascended in mass to penetrate. There is consequently no source, from whence air conveyed to the summit of the atmosphere, could take the heat necessary to such extreme rarefaction: the whole sensible heat of the atmosphere being derived originally from the earth's surface, and distributed in an inverse proportion to the elevation. At an elevation, therefore, not perhaps on a mean more than ten times that of the highest mountains, or fifty miles at the Equator, and considerably less at the poles, I conceive there exists a perpetual *zero* of temperature; and with it an effectual limit to the further expansion of the atmosphere. Here, the spheroidal body of gases, enveloping our globe, has probably a well defined surface (its extent considered) where the air, though greatly attenuated, is much less rare than we can make it in the receiver of the air-pump; in a word, a fluid, capable of rising and falling, like the waters, by change of gravity.

With such a surface, it is plainly possible that the atmospheric ocean may be acted on in the manner of a tide. It may be elevated and rarefied on the side directly opposed to the Moon, and at the same time on the opposite side of the globe; and left to its proper gravity in the remaining part of the mass. And it ought, on this supposition, to exhibit a more perfect example of a tide than even the waters; there being here no shores, as in the ocean, to retard the arrival of the swell at a given place, at the destined hour; or prevent its passing regularly round the middle regions of the globe, in the space of a revolution of the latter on its axis. If I place my hand upon a spiral spring of wire, and depress it, the force being withdrawn the spring follows, and returns immediately to its former state. But if I do the same with a pillow of down, this elastic body, consisting of many small parts acting feebly on each other, takes a long time to resume its full dimensions. There is a similar difference in constitution between the ocean and the atmosphere: and it is very probable, that an interval of six hours is not nearly sufficient for the full effect of rarefaction, and still less for the subsidence and condensation of the air, through its whole depth, to the degree required by the theory of such a tide. The *daily* alternate movements, then, of an atmospheric tide, perhaps from their not having been sufficiently sought among the continual fluctuations of the density of the air at the earth's surface, are not yet demonstrated: but both the Barometer and Thermometer supply, in their respective mean variations, most palpable instances of the weekly increase and decrease of those movements.

In a portion of the atmosphere, the most considerable in point of bulk, situated above the reach of the daily variations of temperature caused by the sun, the alternate rarefaction and condensation here supposed may take place, without producing any other consequence than a current from East to West, around the globe, in that region.

In a lower portion, visited at different times by different proportions of the heat and vapour generated at the earth's surface, it may effect an alternate absorption and condensation of water, with correspondent changes in the electrical state of this region; and thus contribute to decide the occurrence of strong winds, rain, thunder, and other occasional meteors, below.

Still lower, in a region to which our observation more or less extends, the complexity of the causes must necessarily produce effects more difficult to appreciate; and these are brought about, as it seems, chiefly by the succession and interchange of lateral currents. The rarefaction produced in this region by the Sun's heat, is admitted to give rise to a most regular and extensive system of these, commonly called the *Trade-winds.* The air, around the globe over the Equatorial regions, expanded by the heat rises, or is pushed upward by the contiguous cooler air from the North and South; the motion of which combined with the larger motion of the earth's surface from East to West, as the latitude becomes higher, gives rise to a South-east wind on the South side, and a North-east on the North. Such is the admitted principle of the Trade-winds; and it is thought (indeed it must follow) that the air, thus elevated above the Equator, returns in some kind of currents, above the Trade-winds, towards either pole. If we admit a constant Easterly *tide* in the higher tropical atmosphere, into which this rarefied air constantly rises, we shall have a powerful auxiliary to the Sun, in keeping up the Trade-winds; and if we admit that the Moon, by her alternate passage to the North and South in declination, sets this tide alternately to the Northward and Southward of the line, we shall have a principle, on which to solve the greater abundance of rain, and brisker flow of the variable winds, in temperate latitudes, at that season when the Moon becomes vertical to them, than when she is in the other hemisphere. We want indeed, on this point, the concurrent testimony of observations made in some temperate climate, South of the Equator: though we know already that their *polar* winds raise the Barometer, while the *Equatorial* depress it; following the same law as with us, though moving in opposite directions.

The air which flows from the North and South towards the Equator, is felt as an Easterly wind, because it comes from parts of the earth's surface, which have a smaller motion from West to East, than the region into which it is entering: but it gradually acquires the rotary velocity proper to that region. In returning to the temperate latitudes, it has again to lose this Westerly momentum: and this seems to be the principal cause of the great preponderance of Westerly winds in our own climate. We have seen, page 157, that on a mean of ten years, the Westerly were to the Easterly winds as 225 to 140; while the Northerly and Southerly winds balanced each other within 21 days. A wind, coming to us from a considerable distance South, whatever be its velocity, must therefore be felt as a South-west wind: and as the Trade-winds, at certain seasons, appear to have their subsidiary streams or appendages reaching far into the colder latitudes, so these Tropical Southerly gales occasionally make their inroads upon us with greater violence, and for a longer season than usual. It is not unlikely that the British isles, in consequence of their latitude, and from their being as it were a part of its Western barrier, may be the very part of Europe the most exposed to them. A North-east wind, kept up by rarefaction caused by the sun, must find the easiest course upon land; while a South-west, consisting of air which has to descend upon the earth, and spend the momentum it has acquired in more Southern latitudes, is more likely to get easily over the surface of the ocean, and to be arrested by the asperities of the first extensive fixed surface which it encounters. This state of things prevailed remarkably near the close of the winter of 1817, after a long course of violent Westerly gales; when, as far as we may judge from the reports of navigators, the North-east current was for many days no further to the South of us than the coast of Portugal, without our feeling even the skirts of it. See the note at the bottom of page 7 in this volume, and the Results of the next Table.

It is remarkable nevertheless, that on a mean of ten years, ending with 1816, and indeed in most of these, taken separately, the winds to the North and South of West should so nearly balance each other, as that their averages stand 100 : 104. I know of no reason which can be given for this, equally satisfactory, with that of their receiving a direction to North and South alternately, by the Moon's different positions in declination: an effect which, although not to be found in the winds of a particular district, in each Lunar revolution, is yet detected in a long average.

On the whole, it may be inferred that the winds in a temperate latitude, like our own, after escaping from the Tropical vortex, become subject, in winter more especially, to the Moon; and that their tendency is, to follow her path, or the moveable point of greater rarefaction which she marks out for them. Thus it appears from the statement, p. 266, that during her approach to these latitudes, in declination, in 1807 and 1816, the winds from the East and South-east increased, while those from the West and North-west fell off in number. Now if we consider that the Moon's daily course from East to West (which though only apparent has here the same effect as the real,) was coupled, during these weeks, with a motion from South to North in declination, it will appear that a South-east wind would now, in effect, follow her course, and a North-west flow in opposition to it. And in 1816, during the weeks in which the Moon was receding, in declination, to the Southward, and thus offering daily less and less resistance to a North-west wind, this class of winds amounted to double the number which they exhibited in the former case. Again, in both years, and especially in 1807, the class of winds from North to East, which are plainly most influenced by the Sun, appeared in the greatest number while the Moon was in Full South declination, and when consequently there was little of the rarefaction, which she is here supposed to produce, in these latitudes.

The succession and proportion of the winds are consequently subject to a periodical variation from year to year: but the period in which the same, or a similar set of winds comes round again, cannot at present even be conjectured. From the effects produced, in our district, on the average temperature of the years, and on the depth of rain, it may seem to have some connexion with the Lunar cycle of 18 years. But this is a subject well worthy of separate and more deliberate investigation In what I have brought forward, I consider myself to have redeemed the pledge given in the introduction to this work. (vol. I. page v.) I think I have decided in the affirmative (as it regards the phenomena of our own district,) the first part of the question there proposed, "*whether* the relative positions of the Moon, in the different parts of her complex orbit, influence the state of our atmosphere." I have also thrown "some light" on the second part, which proposes to inquire "in what way" this effect is produced. Should it prove so much as shall suffice to stimulate the ambition of Astronomers, in different parts of the world, to annex to the stupendous field of their present labours this lower (if they please so to consider it) and almost uncultivated province, my purpose will be answered; and I have no doubt the consequences will be beneficial to mankind. For although it be a very just remark, that the seasons would not only not go on better for our purposes, but would be in utter confusion, had mankind the *ordering* of them; it does not thence follow that, could we calculate their periods and foresee their extremes, both our personal safety and comfort, and the success of our labours, might not be essentially promoted by such foreknowledge.

An ample, extensive and accurate collection of facts for each climate, is therefore the first *desideratum.*

These should be digested by each observer from his own observations, or from those made in his own district at least, where his local knowledge may greatly facilitate the work. They may be cast either into the forms I have here adopted, or into such others as may be preferred; but as much as possible in a way to be comparable with the results of others. The materials will be found more ample than many would suppose them. To give a single prominent instance, the "Meteorological Observations made at the Royal Observatory at Paris" contain a mine of treasure which it would require years of labour for any single person to explore, in the way in which I have gone through my own and the adjunct observations, belonging to our London district. And I have no reason to think, from the appearance of the few parts I have examined, of those belonging to Paris, that their results would be less regular and systematic than those contained in this volume.

It will be necessary, before this section be dismissed, to give some account of the general Tables, F and G, at the end, entitled "Mean Results of Lunar periods arranged by the Solar year." Wishing to place before the eye collectively, in some part of the work, the results of the Barometer and Thermometer, for the Lunar periods in which my observations had been published, I cast them into the form there exhibited, putting, as nearly as possible, all those which comprised the Solstitial or Equinoctial points, under each other in the same column, and throwing a few periods into a kind of intercalary space at the ends, for this purpose. The date and extent of each of these periods may be found at once, by referring to the Table under the number. They vary in each column, as to date, through a space of not less than 25, nor more than 29 days: consequently each column ranges through a mean space of 55 days: the intercalary results, however, which are cast, in the following averages, along with the first and last columns, add somewhat to the extent of those columns.

The only use which I shall make of these Tables at present is, to give the results of the first ten years in quarterly averages, and deduce some consequences from them. The reader will however notice the regular gradations which the averages at the foot of each Table present; on which subject, as it respects the several *months* of the year, I have already treated.

Averages of Temperature for **38** ***Lunar Revolutions, beginning at New Moon, and for*** **86,** ***beginning at Last Quarter, the whole comprehended in a space of*** **10** ***Solar years;*** **from the 10th of Twelfth mo. Dec. 1806, to the 11th of the same, 1816.**

1. ***Brumal Periods.*** Average of ten periods in the second column and two intercalary	37·92°
Of ten in third column	35·73
Of ten in fourth column	39·63
Of thirty-two periods	37·76
Below the Autumnal 11·61°	
2. ***Vernal Periods.***	
Average of ten in fifth column . . .	42·25
of ten in sixth column . . .	48·92
of ten in seventh column . .	55·67
of thirty periods	48·94
Above the Brumal 11·18°	

3. *Estival Periods.*

Average of ten in eighth column . . .	58·62°
of ten in ninth column . . .	62·39
of ten in tenth column . . .	60·99
of thirty periods	60·66

Above the vernal 11·72°

4. *Autumnal Periods.*

Average of ten in eleventh column . .	56·70
of ten in twelfth column . .	50·75
of ten in thirteenth and two intercalary	40·68
of thirty-two periods	49·37

Below the Estival 11·29°

Averages of the Barometer for 124 Lunar periods, beginning and ending as before stated respecting Temperature.

1. *Brumal Periods.*

Average of ten periods in the second column and two intercalary	29·745 in.
of ten periods in third column	29·788
of ten periods in fourth column	29·874
of thirty-two periods . . .	29·802

Above the Autumnal ·021 in.

2. *Vernal periods.*

Average of ten periods in fifth column	29·870
of ten periods in sixth column	29·814
of ten periods in seventh column	29·812
of thirty periods	29·832

Above the Brumal ·030 in.

3. *Estival periods.*

Average of ten periods in eighth column	29·899 in.
of ten periods in ninth column	29·879
of ten periods in tenth column	29·854
of thirty periods	29·877

Above the Vernal ·045 in.

4. *Autumnal periods.*

Average of ten periods in eleventh column	29·883
of ten periods in twelfth column	29·736
of ten periods in thirteenth column and two intercalary	29·725
of thirty-two periods . .	29·781

Below the Estival 0.96 in.

I consider that by this mode of averaging the *Temperature,* the inequalities, or deviations from the mean of the season, which I suppose to be produced by the Moon's power over the winds, and which are sufficiently apparent (to the extent, indeed, of ten or twelve degrees in most of the columns) in Table G, are completely done away; and the Temperature restored to the course which it ought to have, by the action of the Sun's power alone. The four quarters, accordingly, rise and fall in nearly equal progression; each being, on a mean 11·45° warmer or colder than the preceding quarter.

I consider that, by the same method, the Lunar influence on the *Barometer* is also done away, and the averages of this instrument brought, in Table F, to the state in which they would be found, in each season, had the Moon nothing to do with them. Any remaining inequalities may therefore be fairly attributed to the temperature, and to what may be termed the Solar succession of the different classes of winds through the year; which is exhibited, as to the calendar months, over the diagram of the rain, in page 193.

Under these circumstances, while the Temperature of the several quarters rises and falls in regular progression, the inequalities of the Barometrical heights follow a very different rule. The winter Barometer gains, in its average, ·021 in. upon the Autumnal; the Vernal ·030 in. or half as much more, upon the Winter; the Summer ·045 in. or half as much more still, upon the Vernal; but in the Autumnal average, the whole difference is lost again, and the Barometer comes back to its lowest level.

Now, with regard to the seasons in which the Barometer stands highest and lowest, much may be attributed to the reigning winds.

Thus, the first Estival result, which is the highest of the whole series, lies in the midst of the W—N winds; and the two latter Autumnal ones, in which the mean is depressed to its lowest point, come after a long course of predominant S—W winds. Again the N—E class may be thought gradually to elevate the Brumal periods, and keep up that in which the Vernal Equinox is included; while a subsequent mixture of Southerly winds, in the spring, gives occasion to some depression before the return of the high mean about the Solstice.

But there is a probable cause for this gradation which must not be overlooked, and which has in fact an equal claim with the winds to consideration. The mean state of the Barometer in any moderate district, it is well known, does not represent the weight of the air in that district alone, but for a great extent around it: in which extent different winds may even be found to predominate through the same period of time. And no reason can be given, more appropriate, why the Barometer should rise under a certain course of winds, than that the atmosphere is then receiving an addition to its ponderable mass; or why it should fall, under another course, than that it is then sustaining a loss in this respect. The loss and the gain consist in water; which is at one time converted into vapour, permanent as a part of the atmosphere for the season, at another dismissed in rain. Now, in the Brumal quarter, where we find the average of the Barometer lowest, the Temperature is lowest also; and there is every reason to conclude that the atmosphere in our district, and for many degrees of latitude and longitude around us, contains, at this season, the lowest proportion of ponderable vapour. As the spring comes on, in these latitudes, and the air acquires heat upwards, it acquires also vapour, and therefore weighs more on a mean than in winter. In the summer months, yet more heat and more vapour are accumulated, and the weight of the whole atmosphere attains its maximum. The addition in each of these seasons is in a greater proportion than that of the heat; probably because the higher the latter ascends, and the more rare the medium is, in which the vapour is diffused, the greater the quantity which an equal addition of heat can maintain in its elastic form. At length comes the Autumn, in the course of which the Sun retires to the Southward, the atmosphere of these latitudes cools and collapses throughout, a great proportion of the vapour it held is decomposed, and its water deposited in extensive heavy rains; and the air, losing this portion of its mass, returns to the former low standard of gravity.

Such are the considerations which it seemed needful to take into view, along with the succession of the winds, in accounting for this gradation in the mean height of the Barometer. Should they be founded in fact, a similar gradation will be discovered, by using similar averages, in correct Registers of the Barometer for nearly every part of Europe.

It may perhaps be worth while to include, in any future researches into the variations of temperature connected with the Moon's positions, the question, whether there exists any communication of heat between the two planets *by radiation*. It is a received opinion, but I doubt whether founded on any experiments sufficiently accurate or delicate, that the rays of light which we derive, by reflection, from the Moon, bring no portion of heat whatsoever along with them.

The two planets are certainly very differently circumstanced as to temperature. The Moon being so much the smaller body, and presenting in consequence a much more convex face to the Sun, would, if it were acted upon in the same manner by the Sun's rays, derive from them less heat, and possess in consequence a lower mean temperature than the Earth. But the surface of this planet is presented after a very different manner to the influence of the solar rays. From the time that they impinge on any given part in longitude to the time of their quitting it, a period elapses, equal to twenty-nine of our mean daily periods of sunshine. And the same part, having once emerged from the rays, has an equally long space allowed it to cool again, in uninterrupted darkness.

Moreover the rays, which thus act through a day of two weeks duration, are not as in the case of our polar regions, very obliquely received; but fall on a considerable portion of the surface more or less directly. The effect of this arrangement must be, that the middle regions of the Moon, at least, would experience the extremes of heat and cold, in a way to which no part of the Earth's surface can afford a parallel—unless the vicinity of the latter should prove, by reciprocal radiation, the means of equalising the temperature, in some degree, in both planets.

I mean simply to state it as a possible case, that the Full Moon, with a surface intensely heated by the Sun, may radiate a portion of heat to the colder parts of the Earth's surface towards the poles; more especially when in her extreme North and South declination: and, on the contrary, that the New Moon, having become proportionately cold on the surface opposed to us, may receive by radiation from the Earth, and more especially from the Tropical regions, a compensating degree of heat; which may serve to moderate the rigour of the nocturnal cold on that planet. These are the extreme cases: but if we admit the principle, there will ensue various modifications of the effects, according to the different relative positions of the two planets, and of both with respect to the Sun.

It would be premature, while only two years of observations in our own district have been examined, to attempt to apply this theory to the facts. There is however, something so remarkable in the regularity of the increase and decrease of the mean temperature according to the different Lunar positions, in 1807 and 1816, as stated page 241 and 253, that it will certainly be desirable to examine, whether any thing parallel to it exists in other climates, more especially in the Tropical regions; as well as what aspect the remaining years of the series present, in this respect, in our own.

To ascertain, in a more satisfactory manner, whether or no there exists any radiation between the two planets; I would propose that trial be made with *concave metallic mirrors,* having the bulb of a very sensible Thermometer in the focus; in the manner in which several very instructive experiments have been conducted, on radiation among terrestrial bodies. It is not at all likely that *glass lenses* should detect so delicate an effect as the one in question. If the principle here supposed be real, the rays of the Full Moon, received in the direction of the axis, should raise the temperature in the focus of the mirror some degrees, in a high Northern latitude; and depress it, in situations near the Equator: due attention being paid in both cases, to insulate the Thermometer, and secure as much as possible a stationary temperature in the surrounding medium.

A curious phenomenon, resulting from the play of light between the two planets, is so obvious to common notice, that I am surprized not to have met with any sufficient explanation of it. In the interval between the New Moon and First Quarter, when the Moon is seen in the Western sky after sunset, the dark part of the disk, between the cusps and all round the hemisphere, is sometimes so far enlightened as to be not only visible but conspicuous. And in an equally clear sky at other times, this portion of the disk in the same situation is not to be discovered. It appears that the sunshine on our planet is first reflected to the dark part of the Moon, and from thence back to the eye of the spectator: and the reason why this effect is at times (and only at times) sufficient to render the whole disk visible to us, may be, *that there is then an extensive surface of snow on the Northern American continent.* It will be found, on trial with a globe, that while *we* are contemplating the Moon in the position abovementioned, the Sun is yet sufficiently elevated over those parts of the world, for the snows to reflect its beams very copiously to the Moon's surface. Some observations, made since this appearance first began to attract my notice, compared with accounts of the fall of snow in America, have given the matter sufficient importance in my view, to induce me to throw it out as a conjecture.—But it is now time to quit these speculations, and take, in conclusion, a summary view of the whole subject of the work.

SUMMARY.

London, or the metropolis of the British empire, collectively so denominated, is situate towards the western extremity of the plain, or valley, forming the estuary of the Thames. The course of this river is on the whole from West to East, through the city; a little below which, a smaller plain opens to the North, watered by the river Lea, which here falls into the Thames. The sea is distant fifty miles towards the South, with pretty high land between; and about as much towards the East, where the Thames joins it. The site thus described is bounded, except in the direction of the estuary, by rising ground, and by hills of moderate elevation, from which other streams descend into the Thames on each side. The soil is loam and gravel, on a substratum of clay: and the drainage and embankment being perfect, the country though in some parts considerably wooded, and in others below the level of high water mark in the river, is dry and healthy.

The latitude being 51° 31′ N. we enjoy the Sun in the shortest days, for seven hours and three quarters, and in the longest, during sixteen hours and a half.

The *Mean Temperature* of the *Climate*, under these circumstances, is strictly about 48.50° Fahr.: but in the denser parts of the metropolis, the heat is raised, by the effect of the population and fires, to 50.50°; and it must be proportionately affected in the suburban parts. The excess of the Temperature of the city varies through the year, being least in spring, and greatest in winter; and it belongs, in strictness, to the *nights*; which average three degrees and seven tenths warmer than in the country; while the heat of the day, owing without doubt to the interception of a portion of the solar rays by a constant veil of smoke, falls, on a mean of years, about a third of a degree short of that in the open plain.

The Mean Temperature *of the year* is found to vary in different years, to the extent of full *four and a half degrees*; and this variation is periodical. The extent of the periods, for want of a sufficient number of years of accurate observations, cannot at present be fully determined; but they have the appearance of being completed in *seventeen* years. We may consider one of these cycles, as commencing either with 1790 or 1800, and ending with 1806 or with 1816. See the figure and explanation, p. 94—95.

In either case, a year of mean temperature begins the cycle; in which the *coldest* year falls at the end of ten years, and the *warmest* at the end of seven years, reckoning from the coldest; and thus alternately; both together including a complete revolution of the mean temperature from its higher to its lower extreme—(or *vice versa* from the lower to the higher) and back again. The year 1816, which was the coldest of a cycle, appears to have had its parallels in 1799 and 1782; and there is every reason to conclude, from present appearances, that the warm temperature of 1806 will re-appear in 1823; which will probably be the warmest, and 1833 the coldest, *upon the whole year*, of a cycle of seventeen years, beginning with 1807.

These extreme annual temperatures are gradually produced, and chiefly by elevations and depressions of less extent, which take place in alternate years: and as the character of the year, in other respects, follows the mean temperature, it is very desirable to ascertain, whether similar periods of variation exist in the annual temperature of other European districts, not too remote in latitude and elevation from our own.

The greatest *heat* to which our climate is subject, in the course of one of these periods, is *ninety-six* degrees:—the greatest *cold five* degrees *below zero*. Thus the full range of our Temperature is about 100° of Fahrenheit.*

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* In my first volume (Introd. p. xxxiii) I adverted to the desirableness of our "adopting, by consent, uniform modes, terms, and measures," of observation, in order to render more easy the communication between meteorologists in different countries, and thus advance the science. This hint has been taken up by the editor of the Journal de Physique, in a passage of which the following is the substance:—"There continue to be published in Thomson's Annals, the monthly meteorological observations made at Bushy Heath, near Stanmore, by Col. Beaufoy, and at London by Mr. Howard, to whom the science is indebted for the new nomenclature of Clouds, which is generally adopted in England, and already in use in some parts of Germany, though nearly unknown in France."

"Tilloch's Philosophical Magazine, Schweiger's Journal, and Gilbert's Annals have likewise produced observations of this kind, of which, however interesting, we cannot, for want of room, give an account: we shall therefore content ourselves with observing how important it is, that meteorologists should be explicit in their account of the manner and time of their observations, and that their instruments should be comparable with each other. Indeed it would be worth while, in order to secure this point, that a sort of congress of observers should be held, as M. Pictet proposes, to deliberate on the subject. Unless indeed there should appear some elementary treatise, including all the branches of meteorology, and exhibiting a model, sufficiently well executed to overcome the prepossessions, not of individuals only, Our temperature scarcely ever rises above 80° but the occurrence is followed, either in our own or in some neighbouring district, by a thunderstorm. These tempests are apt to be more severe, and of longer continuance, in our plains, than in the more hilly or mountainous districts of the island; the equilibrium between the clouds and the earth being, here, less easily restored. They appear to be a consequence of the irruption, upon our previously calm atmosphere, of the temperate air of the Atlantic; they are followed by more or less of rain, and by a reduction of the heat for a season.

With regard to the other extreme, we are so situated, that even in the coldest season of the year, the medium of the twenty-four hours, *upon a long average*

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but of learned societies and nations; and thus secure for itself universal reception. If we are to expect such a treatise at all, it appears that it must be from the pen of Mr. Howard, of whom we have just made mention; and who, in effect, has published, in the course of this year, the first volume of a work, entitled the *Climate of London*, which appears likely to fulfil the object." Janvier 1819, p. 31.

However willing I may be, to contribute what lies in my power, to a general good understanding among the cultivators of this science, I must here, once for all, disclaim in favour of some more qualified leader, the pretensions above described. In the mean time, I may be permitted to advance a modest plea in favour of Fahrenheit's scale of the Thermometer, at present used by British meteorologists. There is a convenience in its extent, and even in its mode of graduation, which I should be loath to resign in favour of one, the divisions of which should be either so large, as to require a resort to fractions in every observation; or so minute as to burden the memory, and make it difficult to seize and retain its prominent points and relations. And similar reasons induce me to prefer our own graduation of the Barometer to that at present in use at Paris. Yet there is no doubt with me, that our observers would be disposed to sacrifice, in some degree, their convenience and their predilections, for the great object of a common uniform standard.

of years, does not fall below the freezing point. Continued frost in winter is, consequently, always an exception to the general rule of the climate. The winter even passes, occasionally, almost without frost: in return for which, we have, at uncertain intervals, a rigorous season of many weeks duration, attended with the deep snows, and clear atmosphere, common to more northern latitudes. Our seasons of frost go off, like those of great heat, with a wind from the Atlantic.

The greatest heat falls, on a mean of years, not about the summer solstice, but at an interval of a month after it, and the greatest cold, at the same interval after the winter solstice. The mean temperature of the year is, in like manner, developed at an interval of about a month after either equinox. The nature and reason of this curious law, together with the daily gradation of the heat through the year, which I have fully treated under the head *Temperature,* does not admit of recapitulation here.*

One of the most remarkable features of our climate is, certainly, the great *variableness* of the temperature: which departs from the mean in either direction, in the course of a few days, and sometimes in a single day or night, to an extent greatly exceeding that which the simple presence or absence of the sun would, at that season, occasion. This appears to be the basis of the so much deprecated tendency to cloudiness and frequent rain; which renders our weather usually unpleasant to persons coming from a more southern, or even from a northern clime, if belonging to a continent. Habit, however, completely reconciles the Englishman to a sky, which rarely glows for a week together with the full sun, and which *drips*, more or less on half the days of the year: and he finds, in the vigour inspired by its moderate cold, and in his mental energy, which is kept alive by its incessant changes, an indemnity for any deprivation of the listless animal enjoyment, in which the African and the Asiatic grow weary. Vicinity to the Sun's direct rays is the source of *their sameness*, and singular as it may appear, to those little conversant in such subjects, it is demonstrable, from abundant evidence, (enough of which is even contained in this volume), that we owe most of *our vicissitude*, even in temperature, to the *Moon*. It appears that our attendant planet, principally, if not solely, by the effect of gravity, continually disturbs the density of the atmosphere, producing, in the temperate latitudes of the globe, a *variety of currents*, the different qualities of which, in respect of temperature, moisture and electricity, are developed in the region over which they successively pass. Hence great *variety of weather*;—this however, on the great scale of the year, is regulated by the more or less predominant influence of the Sun's rays, according to his place in declination: which secure to us the enjoyment of our *four seasons* in succession, these fluctuations notwithstanding.

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* I have published on a broad sheet, and in anticipation of that part of my subject, a compendious account, illustrated by a diagram, of the principal phenomena of Temperature in the Climate of London. It is entitled *A Companion to the Thermometer,* and may be had of the publisher of this work.

Referring to the work at large for their varieties, let us review the seasons in their *mean* or standard state—and then the *months* in succession, in their meteorological properties and relations. It may however be repeated here, in order to complete the general standard, that the *mean height of the Barometer*, for the period from 1807 to 1816 inclusive to which wasted for the season the fruitful plains and vallies. See on this subject the Notes under Table 28.

Notwithstanding the sensible indications of moisture, which in the intervals of our short frosts attend this season, the actual quantity of vapour in the atmosphere is now, probably, at its lowest proportion. Or rather, it is so at the commencement of the season; after which it gradually increases with the temperature and evaporation.

In consequence of this low state of the vapour, and the generally weak electricity, in mild weather, the Clouds exhibit little variety, and are easily, and therefore frequently, resolved into rain. The *Cirrostratus* and *Cumulostratus,* with abundance of *scud,* or the scattered rudiments of the Cumulus, chiefly appear: the whole sky hangs low, and the region below it, to the earth, is more or less *misty.* Yet we are not now wholly exempt from thunderstorms; which occur, apparently in consequence of the sudden and plentiful decomposition of vapour, brought in by strong southerly winds.

Hail is, however; of rare occurrence in our winter, if we except a sprinkling of small opake *grains,* which in the fore part of the night indicate the approach of a low temperature, and are found on the frozen ground, and on the ponds, in the morning.

The Snow crystallizes, with us, when slowly and scantily produced, in forms not so various perhaps as those of higher latitudes, yet sufficiently beautiful to be worthy, at all times, of examination: the star of six rays, carrying more or less of secondary branches at an angle of 60°, is the most common. In this respect also the *rime,* which collects on our trees and shrubs, when it just freezes with a moist air, presents considerable variety, and is occasionally magnificent.

The hoar-frost, which whitens our fields usually at the approach of rain, and is not confined to this season, is of two kinds. The most common is *spicular*, like the rime, and collected in this form from the air, though I have some doubt whether the particles are usually frozen until the moment of their attachment to the support: the other is *granular*, and consists of the drops of dew, beautifully solidified by the cold, as they rest on the herbage

Our great frosts are preceded by continued thick mists, from the condensation of the vapour, which continues for some time to be emitted by the rivers and other waters; as well as by the moist soil, until frozen to some depth. I have gone into some detail on the phenomena of our hard and stormy winters, in the Notes under Tables 89, 90, 101, 102, 114 and 115, to which the reader is referred. The simple difference of 4° or 5°, in the medium temperature, suffices sometimes to effect the change from a damp misty state of the air, to comparative dryness and serenity—or the contrary. Our winters, therefore, present every variety of weather which can be expected within the limits of the temperature—from the calm frosty night, with its short day of chearful sunshine, to the gloomy, or thickly clouded sky, when the Southwest wind *surges* among the leafless trees through the nights; or the more dreaded Northeast prevails through the twenty-four hours, driving the snow before it.

From the uncertain occurrence of really dangerous weather in our winters, it is probable that the people make less of the needful provision of clothing, use less foresight in their movements, and in effect, suffer more in proportion from the cold, than the inhabitants of higher latitudes.

SPRING commences the 6th of the Third month, March: its duration is 93 days, during which the *medium* temperature is elevated, in round numbers, from 40 to 58 degrees. The mean of the *season* is 48.94°—the Sun effecting by his approach an advance of 11.18° upon the mean temperature of the winter. This increase is retarded in the fore part of the Spring, by the winds from North to East, then prevalent; and which form two-thirds of the complement of the season; but proportionately accelerated afterwards by the Southerly winds, with which it terminates. A strong *Evaporation* in the first instance, followed by *showers* (often with thunder and hail) in the latter, characterize this period. The temperature commonly rises, not by a steady increase from day to day, but by sudden starts, from the breaking in of sunshine upon previous cold cloudy weather. At such times, the vapour appears to be now and then thrown up, in too great plenty, into the cold region above; where being suddenly decomposed, the temperature falls back for a while, amidst wind, showers and hail, attended in some instances with frost at night.

I have given, under Table 32, a detailed account of one of these hail-storms, the ravages of which I myself witnessed. Our own island, however, suffers but little from them, compared with the fine fields of some provinces of France; which from time immemorial have been subject to their destructive visits. Human ingenuity, always exercised in one way or other in an uncertain strife with the elements, has here however resorted to a bold and singular expedient, and the French actually blow up the nascent storm with gunpowder! An account of this process, as practised in the high lands of the district of the *Maçonnais*, is given under Table 6: and the same page presents an instance, in an accident at Silkstone, *Yorkshire*, (where several persons were drowned by a torrent proceeding from rain in the district above them) of what may be suffered in a neighbourhood, from the want of skilful observation of the gathering of thunderstorms, and the probable course of the waters which they may discharge, in a mountainous country.*

The heat and vapour, notwithstanding these interruptions, accumulate on the whole; and the atmosphere now receives an addition of .030 in. upon the mean of the winter—the Barometer averaging 29.832 inches. But the extreme elevations and depressions of the column go off, in great measure, during the season; and by the end of Spring the range is contracted to about an inch and a half. Mean range of the season 1.81 in.

The Evaporation, taken as before, amounts to 8.856 inches; being about a sixth part *more* than the proportion indicated by the mean Temperature.

Consistently with this proof of *dryness*, the average of De Luc's Hygrometer is 61 degrees.

The average Rain is 4.813 inches. It increases at a small rate through the season: but being greatly exceeded by the evaporation, the soil uniformly gets dried; and the light springs, which issued during the winter from the superficial strata, disappear, or become insignificant.

The lower atmosphere becomes very transparent in the fore part of the season: but the brilliancy of the returning Sun is apt to be eclipsed, during pretty long intervals, by a close veil of *Cumulostratus* clouds; which cover the whole sky with their drapery, connected at certain points by a kind of central stem, or basis of the structure, hanging low in the sky. At other times, under the same course of Easterly or Northerly winds, there appear very regular ranks of a meagre *Cumulus*, coming on from the horizon, and passing away to the opposite quarter, with little or no change of form or magnitude, and unattended in great measure with any other modification. But in the latter part of the season we have more variety of Clouds. The *Cirrus*, which is connected with variable breezes throughout the year, now assumes more of tint and consistency, and is peculiarly fine before thunderstorms: and majestic *Nimbi* traverse the sky in succession, affording slight showers of large opake hail or snow; the prodigious electricity attending which seems to prove, that these singular clouds really act as *conductors*, fitted by communicating a portion of the repulsive fluid, to prepare the way for the descent of subsequent showers, without the necessity of explosions. See an account of the electrical phenomena of one of these, under Table 6; by which it appears that the centre of a shower is *positively* charged, while the circumference is *negative*:—a fact which at once affords a clue for explaining many of the most sudden, and apparently capricious changes, discoverable by the insulated rod, when showers are flying about in distinct bodies; the separate charges of which must, independent of their own composition, produce many phenomena by affecting each other.

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* In the same page, in an account of a thunderstorm which struck a flour-mill, the large chain by which the sacks were drawn up, is stated to have been "melted to a rod of iron." The fact so uncouthly stated probably was, that the tremendous charge thus conducted was just sufficient to reduce the links to a white heat; when the weight of the chain drew their sides together.

It is remarkable, that a *snow-storm*, in the middle of this season, not unfrequently proves the forerunner of the first hot weather, which is developed in ten days, or at most two weeks after it; consistently with this fact, some of the swallow tribe, of which different species come from the South, to avail themselves of our temperate summers for breeding, (if not also to shun the tropical rains) make their first appearance in the midst of such weather. This seems to prove that their approach is not gradual, but rather a rapid flight to our shores, by the help of a superiour Southerly current: and some observations on the phenomena consequent on their disappearance, induces me to suspect, that they avail themselves of similar aid, from a high Northerly current, to return.

A wet Spring seems not at all ungenial in our climate, provided it be followed by a warm and dry summer, as was remarkably the case in 1818: but in general, dry weather, however cold, in the early part of this season, appears to be the wish of our farmers, who have no objection to showers after they have got their seed into the ground. "Humida solstitia atque hyemes optate serenas Agricolæ," says the Latin poet; whose rules in some particulars indicate a climate not so remote from our own, as is that of Mantua at this day. But should the farmer have too much rain for the business in which he is now occupied, it may be some source of consolation to him to be satisfied (as he may be in general) that the circumstance indicates a dry time for the ensuing harvest. I have shewn, in page 203, in what years during my own observation, a portion of the rain usually belonging to the Autumnal equinox, was thus anticipated by the Vernal.

Summer begins the 7th of the Sixth month, *June*, and lasts 93 days. The mean temperature of the season is 60.66°, or 11.72° above that of Spring. The *medium* of the twenty-four hours rises during the season from 58° to 65°; and returns again by the close, to the former level.

The mean height of the Barometer for Summer is 29.877 inches; or .045 in. above the Vernal mean. The atmosphere now acquires, under the more vertical rays of the Sun in Full North declination, the greatest quantity of heat and vapour which it at any time contains; and it accordingly weighs most by the Barometer. The range of this instrument still diminishes to the middle of the season, when it does not exceed an inch: it then gradually increases again to the end: the mean range 1.08 in.

I have shewn that the great fluctuations in the density or gravity of the atmosphere, in our climate, are principally due to our participation, by turns, of the polar and tropical atmospheres, between which we are situate. But our position in Summer, when by the inclination of our pole towards the Sun, we are presented in a more direct manner to the rays, approximates the habits of our climate to those of the equatorial regions; and we thus become more uniform, both in temperature and density, than at any other season;—though still greatly more variable, in both respects, than the countries in that part of the globe. In proportion as the Sun rises higher, and continues longer above the horizon, the Moon, to whose influence I have attributed the variable winds of our climate, becomes depressed, as to our latitudes: her influence, consequently, is diminished, and that of the Sun, to which we have seen ascribed a more uniform action on the winds, is established in its place. Such appear to be the reasons, why the Barometer varies so much less in Summer than in winter: but its movements in ascent or descent in this season, are not therefore the less indicative of those changes in the density of the air, on which the weather, in some considerable degree, depends.

An important part of the Agricultural business of our district, *the making of hay,* is chiefly conducted within the limits of this season. I have no doubt, that this branch of rural œconomy has derived very considerable aid from the use of the Barometer—and in fact, that much less of valuable fodder is spoiled by wet, now, than in the days of our forefathers. But there is yet room for improvement in the knowledge of our farmers, on the subject of the atmosphere. It must be a subject of great satisfaction and confidence to the husbandman, to know at the beginning of a Summer, by the certain evidence of Meteorological results on record, that the season, in the ordinary course of things, may be expected to be a dry and warm one: or to find, in a certain period of it, that the average quantity of rain to be expected for the month has already fallen. On the other hand, when there is reason, from the same source of information, to expect much rain, the man who has courage to begin his operations under an unfavorable sky, but with good ground to conclude, from the state of his instruments and his collateral knowledge, that a fair interval is approaching, may often be profiting by his observations; while his cautious neighbour, who waited for the weather to " settle," may find that he has let the opportunity go by. This superiority, however, is attainable by a very moderate share of application to the subject; and by the keeping of a plain diary of the Barometer, and Rain-guage, with the Hygrometer and the vane under his daily notice.

In this respect, the rule of the distribution of Rain according to the Moon's declination, (see p. 251, &c) may be kept in mind with some prospect of advantage—the time most favorable to *hay-making* being clearly that in which the Moon is far South of the Equator. We are not yet prepared to anticipate the return of such an effect from the Full Moon, as that which we now know to have attended it in 1807. Future registers, and the examination of those extant, will however enable us to do this: and in the mean time it is well to remember, that any judgment respecting the weather is likely to be safe, in proportion only as it is founded on fixed principles, carefully applied by observation.

The predominating winds of our Summer are clearly the W—N, or those which range from the West to North, the latter point not included.

The Mean Evaporation is 11·580 inches, being above a fourth part more than the proportion indicated by the Temperature. De Luc's Hygrometer averages 52 degrees through the season.

The mean Rain is 6·682 inches. I have treated at some length, under the head Rain, of the proportions of Rain in the different seasons; and shown the reason why, if we divide the year into two moieties by the Solstices, we have very unequal proportions of rain with nearly equal mean temperatures; if by the Equinoxes, then very unequal temperature, for the two halves, with nearly equal proportions of rain. I have likewise, in that part of the work, endeavoured to shew the connexion of our rain with the prevailing winds; and the different quarters from which we may more immediately derive the vapour, which forms rain in the different seasons.

Referring to the diagram, page 193, and the several divisions immediately following it, I may here shortly state, that our Summer rains, which are much the most plentiful in the middle of the season, or during the Seventh Month, appear to be the result of a less powerful and constant operation of the same causes which produce the Tropical rains. Hence our wettest summers are those, in which, by the concurring effects of the Sun's declination and the currents, we partake the most of the Tropical atmosphere: and we obtain a dry Summer only by approximating, in consequence of an opposite course of winds, or an atmosphere generally calm or breezy, to the circumstances of the high Northern latitudes. In the one case, we seem to be placed in the great general stream of subsiding air from the South; in the other, in air returning from the Northward, after having deposited its excess of water. A North-west current is therefore our fair weather wind; which will bring us moderate weather and sunshine, so long as it is not interfered with by Southerly currents, which I have shewn to arrive, when they bring us rain and thunder, for the most part with an Easterly direction; consequently in a way the most likely to mix with, and be decomposed by, the prevailing Westerly current.

When there exists a tendency to this process, our Summer clouds, in consequence of the greater quantity and more elevated situation of the vapour, exhibit a magnificence approaching to that of the Tropical sky. The *Cirrus,* which is usually the first to make its appearance after serene hot weather, now spreads its tufts to a greater extent, and assumes a more dense appearance than in spring; and the *Cumulus,* ever beautiful and of favorable aspect when insulated in the midst of sunshine, now tends constantly to inosculate above, or become grouped laterally, with the *Cirrocumulus* and *Cirrostratus* which occupy the middle region. From the mixture of these, and the inter persion of a quantity of *anomalous haze,* in patches or extensive beds, there results a sky, more readily remembered than described, which is very easily and suddenly resolved into thunder showers. The locality of these is often determined by the place of a rapidly growing Cumulus, which becoming a centre of union for the surrounding looser portions, gradually extends itself above and around, till it has put on the form of *Cumulostratus*, the last stage before the explosion, which decides the precipitation of the water in heavy rain. This once begun, the *Nimbus*, with a confused moving and spreading sheet, increasing the obscurity on all sides, renders further observation from below very imperfect. At every interval, however, of some hours duration, with the same winds, the same state of the sky returns again. A tendency to *rain* in such a sky, is perhaps as decidedly indicated, by the grouping of the *Cirrus* and haze in certain parts, in the form of the crown of a *Nimbus*, as by any other symptom; while the *Cirrocumulus*, which is the proper natural index of a rising temperature, is favorable to dryness; except as it forms a part of the preparatory machinery of thunder storms. In the latter case it is usually arranged on a kind of arched base, mixed with the Cirrus and Cirrostratus, and the whole with the haze above mentioned. The immediate tendency to an electrical explosion is always indicated, to those who have the view of the lower part of the cloud, by a surprisingly quick motion of the loose ragged portions of *scud* around it; which seem in haste to obey the powerful attraction of the mass, and take their places in the general arrangement, on which probably the effect depends. A thunder storm in profile on the horizon, in the dusk of the evening, is one of the most sublime spectacles in nature. Such is the immense depth and extent, and the picturesque forms and complex arrangement of these natural batteries, before the explosions:—and when these have commenced, it is easy, for a while, to discover the very cloud from which each proceeds, the whole substance of it becoming, at the moment, *incandescent* with electric light. In proportion as the charge is drawn off, the high-wrought forms of the clouds disappear, the crowns of Nimbi are spread out above, and the whole passes into the more familiar appearance of a distant bank of showers; which in effect it now constitutes.

Autumn begins the 8th of the Ninth month, *September*, and occupies 90 days. The mean Temperature is 49.37°—or 11.29° below the Summer: the medium of the day declines in this season from 58° to 40°.

The mean height of the Barometer is 29.781 inches; being .096 in. below the mean of Summer. The range increases rapidly during this season; the mean extent of it is 1.49 inches.

The prevailing Winds are the class S–W, throughout the season.

The Evaporation is 6.444 inches, or a sixth part *less* than the proportion indicated by the Temperature. The mean of De Luc's hygrometer is 72 degrees.

The average Rain is 7.441 inches: the proportion of rain increases, from the beginning to near the end of the season: this is the true rainy season with us, and the earth, which had become dry to a considerable depth during the Spring and Summer, now receives again the moisture required for springs, and for the more deeply rooted vegetables, in the following year.

These changes in the state of the atmosphere in

Autumn are all referable to one and the same cause—the return of the Sun to the South. The heat declining daily, the store of vapour in the atmosphere undergoes a continued decomposition, the loss of weight arising from which is not made up, as in Summer, by an equal production of new vapour. Hence a declining Barometer, with extensive heavy rains, chiefly in the latter part of the season. The whole increase, derived on the average of the Barometer in Spring and Summer, is thus disposed of, and the atmosphere returns to the minimum of its weight. From the more saturated state of the air, the Evaporation falls short of the Temperature; and the Hygrometer, at the same mean temperature, exhibits an average 11 degrees more moist than that of Spring.

The fore part of this season is, nevertheless, if we regard only the sky, the most delightful part of the year, in our climate. When the decomposition of vapour, from the decline of the heat, is as yet but in commencement—or while the electricity remaining in the air, continues to give buoyancy to the suspended particles, a delicious calm often prevails for many days in succession, amidst a perfect sunshine, mellowed by the vaporous air, and diffusing a rich golden tint, as the day declines, upon the landscape.

At this period, chiefly, the *Stratus* cloud, the lowest and most singular of the modifications, comes forth in the evenings, to occupy the low plains and valleys, and shroud the Earth in a veil of mist, until revisited by the Sun. So perfectly does this inundation of suspended aqueous particles imitate real water, when viewed in the distance at break of day, that I have known the country people themselves deceived by its unexpected appearance.

A phenomenon attends this state of the air, too remarkable to be passed over in silence, though it belongs, in strictness, to another branch of Natural history. An immense swarm of small spiders take advantage of the moisture, to carry on their operations; in which they are so industrious, that the whole country is soon covered with the fruit of their labours, in the form of a fine net-work; the presence of which I have at different times noticed in my Journal, under the term *Gossamer*. They appear exceedingly active in pursuit of the small insects, which the cold of the night now brings down; and commence this *fishery* about the time that the swallows give it up, and quit our shores. Their manner of loco-motion is curious: half volant, half aeronaut, the little creature darts from the papillæ on his rump, a number of fine threads which float in the air. Mounted thus in the breeze, he glides off with a quick motion of the legs; which seem to serve the purpose of wings, for moving in any particular direction. As these spiders rise to a considerable height, in very fine weather, their tangled webs may be seen descending from the air in quick succession, like small flakes of cotton.

On threads of stronger texture, produced by some of these autumnal spiders, and which I have found often extended from tree to tree, for some yards in length, the most minute dew-drops collect in close arrangement, and on the first touch of the support, run together and fall down; giving thus a practical illustration of the manner of the formation of rain in the atmosphere. And both on these, and on webs placed in an oblique or vertical direction, on the shrubs and herbage, and formed with the symmetry usually displayed by this insect, these drops are occasionally found frozen; and a string of little ice beads may be taken up from the web. From the texture thus covered with dew, the solar rays at times reflect innumerable little *irides*, which will not be overlooked by those who know how to appreciate the smaller beauties of an autumnal landscape.

Nor should the heavy *dews* of this season pass unmentioned; which I have sometimes found so abundant, as to be capable of daily measurement in the rain-guage. See the Notes under Tables 24 and 37.

In the drops of dew, when of considerable size, under the clear morning Sun, the Meteorologist may find a good instance of the reflection and refraction which produce the Rainbow. He has only to place himself with his back to the Sun, and singling out a particular drop which appears brilliant with any colour, he may, by changing his position, so as to vary the angle, and keeping his eye on the drop, draw out the different prismatic tints in succession.

The latter part of this season, and beginning of Winter, are more peculiarly subject to gales of wind from the Southwest. While our Northeast breezes are plainly the result of sunshine, and blow almost exclusively by day, *these* appear to prevail chiefly by night: the one forming part of an ascending, the other of a subsiding set of currents. That our Westerly gales come from above, is manifest from the manner in which the clouds indicate, before-hand, the increase and decrease of velocity which they afterwards manifest below. And there seems no way of accounting for their occasional excessive force, but by attributing it to the Westerly *momentum*, which the air acquires in a higher latitude, by revolving in a larger circle about the Earth's axis, and which it may bring with it when suddenly translated Northward. It is even worthy of consideration, whether the sudden depressions of the Barometer, of a few hours duration only, which accompany these gales, and exhibit their minimum about the time of the greatest force of the wind are not to be attributed *to an actual loss of gravity, by the centrifugal force in the air, for the time.*

However much we may be exposed, at seasons, to these boisterous visitants, the tremendous concussion of the elements, properly denominated a *hurricane* is almost unknown in our climate. Yet we may not conclude it absolutely exempt from real hurricanes. The force of the wind is occasionally such for a short time, as to give it the characteristic qualities of this phenomenon—in uprooting and breaking timber trees, damaging solid buildings, and rolling up or removing the heavy sheets of lead with which they are covered. See Tables 28, 39, 77, 101.

To produce, however, one of the most memorable instances on record, I shall make some extracts from an old publication, having the following title, The Storm, or a collection of the most remarkable casualties and distresses which happened in the late dreadful tempest both by sea and land. London, 1704. 12 mo. p. 272. The motto, The Lord hath his way in the whirlwind, and in the storm, and the clouds are the dust of his feet. Nah. i. 3.

The date of this tempest, as to its extreme violence, is the night of the 26–27 November, O.S. 1703, being about the time of New Moon. It appears to have been preceded by a very wet season for about six months.

" It had blown exceeding hard (says the anonymous compiler, who seems to have been a man of respectable rank, and careful to have authorities for his facts) for about fourteen days past, that we thought it terrible weather; several stacks of chimnies were blown down, and several ships lost, and the tiles in many places blown off the houses; and the nearer it came to the fatal 26th of November, the tempestuousness of the weather encreased.

" On the Wednesday morning before, being the 24th of November, it was fair weather and blew hard; but not so as to give any apprehensions, till about four o'clock in the afternoon the wind increased, and with squalls of rain and terrible gusts blew very furiously. The wind continued with unusual violence all the next day and night; and had not the *Great Storm* followed so soon, this had passed for a great wind.

" On Friday morning it continued to blow exceeding hard, but not so as that it gave any apprehensions of danger without doors. Towards night it increased; and about 10 o'clock our Barometers informed us that the night would be very tempestuous—*the mercury sunk lower than ever I had observed it on any occasion.* It did not blow so hard till 12 at night, but that most families went to bed: but about 1, or at least by 2 o'clock, 'tis supposed, few people that were capable of any sense of danger, were so hardy as to lie in bed. And the fury of the tempest increased to such a degree, that as the Editor of this account, being in London and conversing with the people the next day, understood, most people expected the fall of their houses. And yet, in this general apprehension, nobody durst quit their tottering habitations; for whatever the danger was within doors, 'twas worse without. The bricks, tiles, and stones, from the tops of the houses, flew with such force, and so thick in the streets, that no one thought fit to venture out, though their houses were near demolished within.

" It is the received opinion of abundance of people, that they felt, during the impetuous fury of the wind, several movements of the earth; and we have several letters which affirm it: but as an earthquake must have been so general, that every body must have discerned it; and as the people were in their houses when they imagined they felt it, the shaking of which might impose upon their judgment, I shall not venture to affirm it was so. Others thought they heard it thunder. 'Tis confess'd the wind by its unusual violence made such a noise in the air, as had a resemblance to thunder;—the roaring had a voice as much louder than usual, as the fury of the wind was greater than was ever known: the noise had also something in it more formidable; it sounded aloft, and roared not very much unlike remote thunder. And yet, though I cannot remember to have heard it thunder, or heard of any that did, in or near London, in the countries, the air was seen *full of meteors and vaporous fires*; and in some places both thunderings and universal flashes of lightning, to the great terror of the inhabitants.

" From two of the clock the storm continued, and increased till five in the morning; and from five to half an hour after six, it blew with the greatest violence. The fury of it was so exceeding great for that particular hour and half, that if it had not abated as it did, nothing could have stood its violence much longer. In this last part of the time, the greatest part of the damage was done. Several ships, that rode it out till now, gave up all—for no anchor could hold. Even the ships in the Thames were all blown away from their moorings, and from Execution-dock to Limehouse hole, there were but four ships that rode it out: the rest were all driven down into the *Bight*, as the sailors call it, from Bell wharf to Limehouse, where they were huddled together and drove on shore, heads and sterns, one upon another, in such a manner as any one would have thought it had been impossible.

" The points from which the wind blew are variously reported from various hands. 'Tis certain, it blew all the day before at SW, and I thought it continued so till about two o'clock; when as near as I could judge by the impressions it made on the house—for we durst not look out—it veer'd to the SSW, then to the W; and about six o'clock to W by N—and still the more Northward it shifted the harder it blew, till it shifted again Southerly about seven o'clock; and as it did so it gradually abated.

Though the storm abated with the rising of the Sun, it still blew exceeding hard; so hard that no boats durst stir out upon the river, but upon extraordinary occasions; and about three o'clock, the next day, it increased again, and we were in a fresh consternation.—At four it blew an extreme storm with sudden gusts as violent as at any time of the night; but

as it came with a great black cloud and some thunder, it brought a hasty shower of rain which allayed the storm, so that in a quarter of an hour it went off, and only continued blowing as before.

" This sort of weather held all Sabbath-day and Monday, till on Tuesday afternoon it increased again, and all night blew with such fury that many families were afraid to go to bed.—At this rate it held blowing till Wednesday about one o'clock in the afternoon, which was that day sevennight on which it began—so that it might be called one continued storm from Wednesday noon to Wednesday noon. In all which time there was not one interval, in which a sailor would not have acknowledged it blew a storm; and in that time two such terrible nights as I have described."

Such a tempest could not be supposed to be limited to this island—accordingly it appears to have spread over a great part of the North of Europe, though no where with equal impetuosity as with us. As to the effects, they were generally these: Over most part of South Britain and Wales, the tallest and stoutest timber trees were uprooted, or snapt off in the middle. It was computed that there were twenty-five parks in the several counties, which lost a thousand trees apiece —the New Forest, Hants, above four thousand. Whole sheets of lead were blown away from the roofs of strong buildings: seven steeples, above four hundred windmills, and eight hundred dwelling houses, blown down; and barns, out-houses, and ricks in proportion besides a great destruction of orchards. About one hundred and twenty persons lost their lives on land, among whom were the Bishop of Bath and Wells and his lady, who unhappily lodged in a ruinous castle: also the engineer who had erected the then lighthouse at the Eddystone; who was blown into the sea along with the structure, which he had promised himself would bid defiance to the elements.

At sea there were few ships to sink—the previous terrible weather having brought them into port in very unusual numbers—but in the harbours and roadsteads of England, so many vessels ran foul of each other and sunk, or foundered at anchor, or were driven on the sands, or to sea where they were never heard of, that it is computed eight thousand seamen at least perished on the occasion. A vessel laden with tin, being left in the small port of Helford near Falmouth, with only a man and two boys on board, drove from her four anchors at midnight, and going to sea, made such speed before the wind, almost without a sail, that at eight in the morning, by the presence of mind of one of the boys, she was put into a narrow creek in the Isle of Wight, and the crew and cargo saved.

This run may give us some conception of the velocity of the wind: for if we consider that the course of the vessel, even by the winds, could not have been direct, but in a large curve outwards from the coast, the rate at which she went exceeded thirty miles an hour on the average: and that of the wind must have been three or four times greater.

The estuary of the Severn, lying more particularly in the course of this storm, the parts bordering on that river suffered much by the breaking in of the sea. The country for a great extent was inundated, the vessels driven upon the pasture land, and many thousands of sheep and cattle drowned.

To conclude this description, the spray of the sea was on this occasion carried far inland in such quantities, as to form little concretions or *knobs* of salt on the hedges; and at twenty-five miles from the sea, in Kent, made the pasture so salt, that the cattle for some time would not eat it. The total damage was considered, by the Editor of the work I have been quoting, to exceed that of the great fire of London.

First Month. January.

The Sun in the middle of this month continues about 8 h. 20 m. above the horizon. The *Temperature* rises in the day, on an average of twenty years, to 40·28°; and falls in the night, in the open country, to 31·36°—the difference 8·92°, representing the mean effect of the Sun's rays for the month, may be termed the *Solar variation* of the Temperature.

The Mean temperature of the month, if the observations in the city be included, is 36·34°. But this mean has a range, in 10 years, of about 10·25°, which may be termed the *Lunar variation* of the Temperature. It holds equally in the decade, beginning with 1797, observed in London, and in that beginning with 1807, in the country. In the former decade, the month was coldest in 1802, and warmest in 1804: in the latter, it was warmest in 1812, and coldest in 1814.* I have likewise shewn, in the curves facing page 144, that there was a tendency in the *daily* variation of temperature through this month, to proceed, in these respective periods of years, in opposite directions. The prevalence of different classes of winds, in the different periods, is the most obvious cause of these periodical variations of the mean temperature.

The *Barometer* in this month rises, on an average of ten years, to 30·40 in. and falls to 28·97 in. the *mean range* is therefore 1·43 in.; but the extreme range in 10 years is 2·38 in. The mean height for the month is about 29·79 inches.

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* As the Temperature of the month in other years approaches near to either extreme, the reader will do well to consult Table A, from whence these results are taken, as he proceeds.

The prevailing *winds* are the class from West to North. The Northerly predominate, by a fourth of their amount, over the Southerly winds.

The average Evaporation (on a total of 30·50 inches for the year) is 0·832 in., and the mean of De Luc's Hygrometer 80.

The mean Rain, at the surface of the earth, is 1·959 in.; and the number of days on which snow or rain falls, in this month, averages 14,4.

A majority of the *nights* in this month have constantly the temperature at or below the freezing point.

Second Month. February.

Length of day in the middle of the month about 9 h. 55 m.

Mean of greatest heat by day 44·63°, of greatest cold by night 33·70°: difference, or *Solar variation* 10·93°.

Mean temperature of the month, the city temperature included, 39·60°: difference in the mean, or *Lunar variation,* from 1797 to 1806, in London, 7·45°; from 1807 to 1816, in the country, 11·75°. The month was coldest in 1800 and 1814, and warmest in 1806 and 1809.

The Barometer ranges, on a mean, from 30·42 to 29·07 in.: difference 1·35 in.: but the full range in 10 years extends to 2·01 inches. Mean height for the month 29·874 in.

The prevailing winds are the class from South to West.

The proportionate evaporation is 1·647 in.: and the mean of De Luc's Hygrometer 75 degrees.

The average Rain at the surface is 1·482 in.: and the average number of days on which any falls, 15,8. This is the month in which, on the whole, rain or snow falls the oftenest. The frosty nights vary from three to twenty-two, and the average of these on ten years is *eleven.*

Third Month. March.

The middle day has the Sun for about 11 h. 50 m.

The mean heat rises by day to 48·08°, and falls by night to 35·31°; the *Solar variation* is therefore 12·77°.

The Mean temperature of the month is 42·01°, the London observations included. The *Lunar variation,* in the first decade, was 6·74°; in the second 11·08°. The month was coldest in 1799 and 1807, and warmest in 1801 and 1815.

The mean range of the Barometer in this month is from 30·40 to 29·10, or 1·30 in.; the full range for 10 years being 1·80 in. Mean height for the month 29·87 inches.

The prevailing winds are decidedly the class from North to East: and these sensibly impede the advance of the Temperature.

The proportionate evaporation is 2·234 in.: and the mean of De Luc's hygrometer 67 degrees.

The average Rain at the surface is 1·299 in.: and it rains on a mean, in this month, only on 12,7 days.

There are, on an average, *twelve* frosty nights in this month; the proportion varies from five to twenty-three.

Fourth Month. April.

The Sun is above the horizon, in the middle of the month, about 13 h. 57 m. The Temperature rises by day to 55·37°, and falls by night to 39·42°: the *Solar variation* is consequently 15·95°.

The Mean temperature of the month, for London and the country, is 47·61°. It varied in the first decade 7·54°, in the second 8·64°: the *Lunar variation* is therefore probably pretty uniform. The month was warmest in 1798 and 1811, and coldest in 1799 and 1808.

The Barometer ranges, on an average, from 30·23 to 29·15 inches: the mean range is therefore 1·08, but the full range in ten years is 1·62 inches. Mean height for the month 29·814 inches.

The prevailing winds are still from North to East: yet the advance of the Temperature is now somewhat quicker.

The proportionate evaporation is 2·726 in: being little more than in last month: the mean of De Luc's Hygrometer is however 60.

The mean amount of Rain at the surface is 1·692 in.: and it falls on an average on 14 days of this month.

During ten years, this month never passed quite without a frosty night or morning, and it has *six* of these on an average.

Fifth Month. May.

The length of the middle day is about 15 h. 35 m. The heat rises, on a mean, in the day to 64·06°, and falls in the night to 46·54°. *Solar variation* 17·52°.

The Mean temperature of the month, with the city included, is 55·40°: the *Lunar variation* in the first decade was 7·44°; in the second 10·54°. The month was warmest in 1804 and 1811, and coldest in 1802 and 1816.

The Barometer rises, on a mean, to 30·25, and falls to 29·34, mean range 0·91 in: but the full range in ten years is 1·52 inch. Mean height for the month 29·812 inches.

The prevailing winds are the class from South to West: by means of which, in aid of the sun, we get an advance in this month, upon the last, of near eight degrees, and acquire some heat against the coming in of summer.

The proportionate evaporation is now 3·896 in.: and the mean of De Luc's Hygrometer 57 degrees.

The average rain at the surface is 1·822 in.: and rain falls on 15,8 days of this month.

In five seasons out of ten, the nocturnal Temperature, or that a little before sun-rise, touches in this month once or twice upon the freezing point.

Sixth Month. June.

The length of day, in the middle of this month, extends to about 16 h. 32 m. The mean heat rises in the day to 68·36°, and falls in the night only to 49·75°: the *Solar variation* is then 18·61°, which is the largest for the year; consistently with the Sun's greatest altitude on the 21st of this month.

The Mean temperature of the month, with London included, is 59·36°. It varies, in the ten years from 1797 to 1806, 6·44°, and in the following decade 5·80°. The *Lunar variation* is therefore pretty uniform, and on the whole at its minimum for the year. The month was warmest in 1798 and 1811; and coldest in 1797 and 1812.

The Barometer rises, on a mean, to 30·28, and falls to 29·45; the difference 0·83 in.: but the full variation in this month, for ten years, is 1·25 inch: the mean height for the month about 29·90 inches.

The prevailing winds are the class from West to North.

The proportionate evaporation is 3·507 inches, being less than that of last month, the advance of the temperature notwithstanding. The mean of De Luc's Hygrometer 52 degrees.

The mean amount of rain is 1·920 in.: the average number of days on which any falls is 11·8 only, being the lowest of any month in the year.

I meet with no instance, in the course of ten years, of a frosty night or morning in this month.

Seventh Month. July.

Length of the middle day about 16 h. 5 m. Mean highest temperature by day 71·50°; mean lowest by night 53·84°. *Solar variation* 17 66°.

Mean temperature of the month, for London and the country, 62·97°. The *Lunar variation* is nearly uniform, being 7·14° for the decade of observations in London, and 8·40° for that in the country. The month was hottest in 1803 and 1808, and coldest in 1802 and 1812.

The Barometer rises, on the average, no higher than 30·18, and sinks only to 29·49 inches: the mean range is therefore 0·69 in.: and the full range being only 0·99 in. it has in this month the smallest variation in the year. Mean height about 29·88 inches.

Notwithstanding this state of the Barometer, the class W—N continues to include the winds most prevalent in this month: and these, with their antagonists from the Southward, occasionally blow with considerable force at this season. See the Notes under Table 121.

The proportionate evaporation is 4·111 inches; and the mean of De Luc's Hygrometer again 52 degrees.

The average rain of the month is 2·637 inches: and rain falls, on a mean, on 16 days of this month.

Eighth Month. August.

On the middle day of this month we have the Sun for about 14 h. 32 m. The heat rises by day, on a mean, to 71·23°, and sinks by night only to 53·94°: we have now the warmest nights in the year, and but little abatement of the temperature by day. The *Solar variation* therefore keeps up to 17·29°; which is a degree and one-third more than in the corresponding month in spring, the fourth. But we are to recollect that, at the present season of the year, the action of the Sun's rays is considerably assisted by the warm earth, which radiates heat into the air: while in spring, it absorbs every day a proportion of the heat which the Sun produces.

The mean heat of the month, with London included, is 62·90°. The *Lunar variation* is very uniform, being 7·07° in the first decade, and 7·44° in the second. The month was hottest in 1802 and 1807, and coolest in 1799 and 1812.

The Barometer rises on a mean in this month to 30·19, and sinks to 29·43 in; the mean range is consequently ·76 in: the full range for 10 years is 1·02 in. Mean height for the month 29·854 in.

The winds from West to North prevail most in this month also.

The proportion of Evaporation is 3·962 inches, and De Luc's hygrometer continues to average 52 degrees.

The average Rain of the month is 2·125 inches; and it falls, on a mean, in this month, on 16·3 days. The rain in this, and the two preceding summer months, presents a very uniform average, (when corrected for the different elevation of the guages,) on the two decades of years.

Ninth Month. September.

The middle day is about 12 h. 39 m. from sun-rise to sun-set. The heat, on a mean, rises to 65·66°, and falls to 48·67°; making a *Solar variation* of 16·99°. This is but a fraction of a degree less than that of last month, and 4·22° more than in the Third month. From the different place of the Equinox in each, the Third is astronomically colder than the Ninth month; but we have besides, and in a greater degree, a source of inequality in their temperature, in the absorption and radiation of heat by the earth, already treated of.

The Mean temperature of this month is, for London and the country together, 57·70°. The *Lunar variation* is nearly uniform, being 6·61° for the first decade, and 5·98° for the second. The month was coldest in 1803 and 1807, and warmest in 1804 and 1810.

The mean of ten maxima of the Barometer for this month is 30·23 in: of ten minima 29·33 in: giving a mean range of ·90 in: but the full range on ten years is 1·54 in.: mean for the month 29·883 in.—the greater oscillations beginning now to come on again, in proportion as the temperature declines, and the currents get more interchange of direction, Northward and Southward. The prevailing winds of this month are, on the whole, the class S—W.

The mean proportionate evaporation is 3·068 inches, and the mean of De Luc's Hygrometer 64 degrees.

The average Rain for the month is 1·921 in: and the number of days on which any falls, only 12,3: so that, on the ten years from 1807, it is the month which stands next, in point of dryness to the sixth; the Third being, however, nearly equal to it. It is proper to remark, that on the decade from 1807 to 1816, the average rain for this month is about half an inch *less* than on the former decade; while for the Third month, it is about as much *more*. The translation of a portion of rain from the autumnal to the vernal equinox obtained, therefore, in a greater degree in the latter, than in the former period.

In this month we have occasionally a frosty night or two. In 1816, it froze pretty sharply on the 2d: in 1815, on the 6th and 7th: and in 1807, by placing a Thermometer near the ground, I detected a Temperature of 26°, on the 13th of the month.

Tenth Month. October.

The middle day of this month has the Sun for about 10 h. 37 m. The mean of greatest heat by day is 57·06°, of greatest cold by night 43·51°; the *Solar variation* 13·55°.

The mean Temperature, for the city and country, is 50·79°; the *Lunar variation* of which is smaller, in the decade for the city, than in any other instance in these observations, being only 4·51°: but in the country decade it amounts to 9·18°. I am not prepared to suggest any peculiar cause for this very small variation in one decade, while a mean one obtains in the other; but we shall see a more remarkable instance of this in the Twelfth month. The Tenth month was coldest in 1797 and 1814, and warmest in 1804 and 1811.

The Barometer in this month rises, on a mean, to 30·21 and sinks to 29·05 in.; mean range 1·16, full range 1·82 in.; mean height for the month 29·736 in.

The Winds from South to West predominate.

The proportionate Evaporation is 2·208 in.: and De Luc's Hygrometer averages now 71 degrees.

The average Rain is 2·522 inches: it rains, on a mean, on 16·2 days of the month. The month became somewhat wetter in the decade beginning with 1807, than it had been in the preceding ten years.

The Tenth month is less subject to frost, than we might expect from the advanced period of the year. It has not usually above *four* nights, and sometimes none at all, with the Thermometer below the freezing point: the warmth of the ground is one obvious cause.

Eleventh Month. November.

The middle day of the month extends only to 8 h. 49 m. The average temperature, however, rises to 47·22°, and sinks only to 36·49°, making a *Solar variation* of 10·73°; while in the First month, with a mean day of 8 h. 20 m. it was but 8·92°. It may be necessary, both in this month and the last, to admit as an additional cause of the comparative warmth, the heat given out by the great quantity of aqueous vapour now condensed into rain: while in Spring, the temperature may be proportionately kept down by the effect of evaporation, in which process much of the atmospheric warmth occasionally disappears.

The mean Temperature, for the whole district, is 42·40°. It varies 7·52° in the decade beginning with 1797, and, 8·14° in that beginning with 1807; the *Lunar variation* is therefore nearly uniform. The month was coldest in 1798 and 1816, and warmest in 1806 and 1811.

The Barometer, which constantly enlarged its movements in receding from the Summer season, now exhibits the greatest *depressions*. It rises, on a mean, to 30·36, and sinks to 28·90 inches, making the range in this way 1·46 in.: but the full range in ten years is 2·12 inches. Mean height for the month 29·725 inches.

Consistently with this state of the Barometer, we have now the Southwest winds oftenest—but with a large mixture at intervals of Northerly; which average considerably above their mean. Perhaps the greatest interchange of these currents now takes place in our atmosphere.

The proportionate Evaporation is now reduced to 1·168 in.; and the mean of De Luc's Hygrometer advanced to 80 degrees.

The mean Rain of this month is 2·998 inches: it is consequently the wettest month in the year: and it is observable, that it was somewhat drier in the decade beginning with 1807, than in the preceding ten years. Rain falls on precisely half the number of days in the month.

In this, and the preceding month, but most in the present, the depressions of temperature occur, which bring on the cold of Winter in our climate. It will be seen that we lose about 8 degrees on the mean. A gloomy windy sky is accordingly the prevailing characteristic of the season; but this is not constant; and we have at intervals also in this month, very fine days, with clear nights and hoar-frosts.

With regard to frosts, this month has eleven or twelve nights on an average, on which the Thermometer is at, or below 32°; and the following *gradation* appears in the number of such nights in the month, from 1811 to 1816 inclusive, viz. 5, 9, 12, 14, 17, 20; shewing the progressively increasing tendency to a low temperature, as this series of years proceeded.

Twelfth Month. December.

Our day is reduced, in the middle of this month, to about 7 h. 46 m. The average Temperature rises to 42·66°, and sinks to 33·90°. The *Solar variation* is therefore only 8·76°, being the smallest for the year; consistently with the Sun's place in declination.

The mean Temperature, with London included, is 38·71°. It varied, in the decade from 1797 to 1806, to the extent of 14·45°; and in that from 1807 to 1816, only 5·45°. The *Lunar variation* is therefore now the most extensive, and the least uniform. The mean of this month in 1799, in London, was 34·30°: the month had become nearly as cold in the preceding year, having then sunk in its mean about 7½ degrees. In 1806 it was, by the London observations, 48·75°, and by my own at Plaistow 46·27°. It had increased in the preceding year; and a similar gradation from cold to warmth in this month took place in the years 1801–2–3, when it was carried in the last, to 42·78°. In the latter decade, on the contrary, the gradation twice proceeds, through four years, towards the lower extreme.

By returning to Tables 1, 2, the reader will see the *immediate* cause of the hibernal warmth, in the great prevalence of Southerly winds, more especially the SW. By these, the temperature of the fore part of the winter was kept up nearly to the pitch of spring: and the Notes present some instances of the effects which this had on vegetation. A decided flow of air from the Southward, without almost the intervention of a frosty night, must be expected to produce a very different mean, from a season in which most of the nights are frosty. And the difference from this cause be expected to be greatest, when we have the least of the Sun's influence: but the question, *what* *it is that determines this Southerly current to our district,* in one year or series of years more than another, remains to be solved.

The Barometer rises, on a mean, to 30·40, and sinks to 28·95 inches, giving a mean range of 1,45 in.: the extreme range being 2·37 inches, nearly as large as in the First month, which is the greatest for the year. The mean height of the Barometer is 29·745 inches.

The Westerly winds, on the whole, preponderate. The proportionate Evaporation is 1·12 in.: and De Luc's Hygrometer continues to exhibit its winter mean of 80 degrees.

The average Rain is 2·427 inches. Rain or snow falls on 1,77 days of the month; which is therefore, nearly, the most subject to what is sometimes provincially termed "falling weather."

On an average of ten years, about half the nights in this month appear to be frosty.

TERMINOLOGY OF CLOUDS, &c.

In the Introduction, page xxxii, I promised an explanation of the terms used for Clouds. I shall therefore extract, from the Essay already in print on that subject, the *definitions* of the several kinds of Clouds; referring to that piece, for a more particular account of their nature. To this I shall add a few definitions of other phenomena, mentioned in these volumes, with such remarks as may assist a person, already somewhat conversant in Meteorology, to distinguish them with accuracy.

Modifications of Clouds.

Clouds are susceptible of various modifications.

By this term is intended the structure or manner of aggregation, in which the influence of certain constant laws is sufficiently evident, amidst the infinite less diversities resulting from occasional causes.

Hence the principal modifications are as distinguishable from each other, as a tree from a hill, or the latter from a lake; although clouds, in the same modification, compared with each other, have often only the common resemblances which exist among trees, hills, and lakes, taken generally.

There are three simple and distinct modifications, which are thus named and defined.

1. Cirrus. *Def.* Nubes cirriformis tenuissima, quæ undique crescat.

The Cirrus. A cloud resembling a lock of hair, or a feather. Parallel flexuous, or diverging fibres, unlimited in the direction of their increase.

2. Cumulus. *Def.* Nubes densa cumulata, sursum crescens.

The Cumulus. A cloud which increases from above in dense, convex, or conical heaps.

3. Stratus. *Def.* Nubes strata, aquæ modo expansa, deorsum crescens.

The Stratus. An extended, continuous, level sheet of cloud, increasing from beneath.

There are two modifications, which appear to be of an intermediate nature; these are:

4. Cirrocumulus. *Def.* Nubeculæ subrotundæ connexæ vel ordinatè positæ.

The Cirrocumulus. A connected system of small roundish clouds, placed in close order, or contact.

5. Cirrostratus. *Def.* Nubes extenuata, sub-concava vel undulata. Nubeculæ hujusmodi appositæ.

The Cirrostratus. A horizontal or slightly inclined *sheet*, attenuated at its circumference, concave downward, or undulated. Groups or patches having these characters.

Lastly, there are two modifications, which exhibit a compound structure, viz.

6. Cumulostratus. *Def.* Nubes densa, quæ basi cumuli structuram patentem cirro-strati vel cirrocumuli superdat.

The Cumulostratus. A cloud in which the structure of the Cumulus is mixed with that of the Cirrostratus, or Cirrocumulus. The Cumulus flattened at top, and overhanging its base.

7. Nimbus. *Def.* Nubes densa, supra patens et *cirriformis,* infra in pluviam abiens.

The Nimbus. A dense cloud, spreading out into a crown of Cirrus, and passing beneath into a shower.

After the experience of eighteen years, I do not find a necessity either to make additions to this little system, or to retrench any of its parts. Some subordinate distinctions may, indeed, at a future period, be found useful; but until the classification, as it is, be generally adopted, its simplicity must form its most powerful recommendation; next to (what I trust it has been found to possess) a strict conformity to nature. For like reasons, I am averse from giving on every occasion, *plates* of the modifications; having found that the copying of a particular *form* of each tends too much to limit the reader's views, in looking for it in the sky; while the exhibition of many varieties, would only serve to perplex him at the outset. It is in the *structure*, carefully considered with due reference to situation, that he will find the basis of a correct judgment; and he will do well to wait, at first, for several successive appearances of each modification, to which he will thus at length find the definition apply in all its parts.

Remarks on the Modifications.

1. The *Cirrus* comprehends every thing that is manifestly *fibrous* in structure, among the clouds. In the Nimbus it exists *in composition*, forming the crown or summit of the cloud: the connexion with falling rain in this case, being generally obvious, from an obscurity beneath the cloud, as seen above the horizon.

The Cirrus occupies commonly the highest place in the sky; but is sometimes observed mixed with, and even occasionally below, other modifications. Its density and progressive motion are also, usually, the least of any: though the propagation of its fibres by increase is occasionally pretty rapid. It may go on increasing, both in extent and density, to a completely overcast sky; in which case, it is followed by other modifications below, and ultimately by rain.

This cloud may be regarded as a collector of the *Electricity*, as well as of the scattered particles of water, from the higher atmosphere. In this respect its nature is very well illustrated by the arborescent figures, which Electricians form, by projecting a coloured powder on cakes of wax, previously touched with the knob of a charged phial.

2. The *Cumulus*, on the contrary, is an aggregate, which seems to retain an electric charge just sufficient for its own buoyancy, during its increase. The several clouds of this kind must, likewise, exercise a degree of repulsive action on each other, since when the modification is pure, they keep as it were at measured distances in the sky. In this state also, each cloud would always be a spheroid, or roundish aggregate, were it not for the evaporation prevailing in the lower atmosphere at the time, which cuts off all the Cumuli visible at once to a certain height, presenting their bases in the same horizontal plane.

This is a fair-weather cloud, produced by day, and carried, at whatever elevation, by the current which flows next the earth. If not disposed of in one of the compounds hereafter mentioned, it evaporates in the evening.

3. The *Stratus* must always be looked for *in contact with the earth or water;* in vallies, on extensive plains, and in the moist meadows of hilly tracts. It should not be confounded with sheets of cloud, which may be seen buoyant in the air, resting on hill tops, or sweeping the plains near the ground, or creeping along the flanks and through the defiles of mountains. All these are referable to the Cirrostratus. The pre-

sent modification does not *travel*, but is propagated, by a pretty rapid increase through a certain space and elevation, in a calm atmosphere. In the morning, it is either dissipated, by virtue of a rising temperature in the region it occupies, or driven upward with the appearance of the nascent Cumulus. It is electric, and though capable, in the course of a night, of depositing a very copious dew, does not readily wet the cloaths or the person, in passing through it.

4. The *Cirrocumulus* occupies the next place, in point of elevation and buoyancy, to the Cirrus; and is apparently the immediate result of the cessation of the conducting process, which obtains during the increase of the latter. The previous appearance of a Cirrus does not, however, appear necessary to its origin. This cloud may be considered as a system of small Cumuli, maintaining a sort of equilibrium among themselves in their electric charge, or tending slowly to inosculate laterally; in consequence, perhaps, of which tendency, the larger nubeculæ are generally seen to occupy the central part of the group. It is the natural index of a rising temperature, in the higher atmosphere; and the warmth of the region in which it floats is commonly felt, after some time, at the earth's surface. Before thunder-storms, it has a peculiar character. The nubeculæ then grow rapidly upward, upon a kind of arched base, connecting the group at bottom. Independent of its connexion with thunder, it is a fair-weather cloud; and when, as sometimes happens, it inosculates with a Cumulus beneath, retaining its rounded forms, the indication is a favorable one. It is often seen mixed in the same sky with Cirrus and Cirrostratus, and may pass to either of these modifications; the prognostic being found to vary accordingly.

5. The *Cirrostratus* is the natural index of depression of temperature in a vaporous atmosphere, and consequently of wind and rain. A slight appearance of it very commonly attends the production of the evening dew. It may be conceived to originate in the condensation of vapour in successive horizontal strata, the product immediately subsiding through the air below, where it still receives an increase.

It is apparently non-electric or but very weakly charged, and wets all bodies alike. The trees on hilly tracts drip profusely during its passage, even while the soil remains dusty beneath; and in riding through it, I have repeatedly found it collect on the palpebræ, and run into the eyes. When the temperature is about the freezing point, this cloud affords also a copious product of rime, which collects chiefly on the windward side of the twigs and branches.

I have found it impracticable to confine this modification to the form of a perfectly continuous sheet, although the admission of nubeculæ makes it difficult always to separate the Cirrostratus from the Cirrus and Cirrocumulus; more especially as these three modifications are liable, by changes in the medium, to pass each into the other. A proper degree of attention, from time to time, to the connexion in which it is found, and the attendant state of the atmosphere, will nevertheless, at length, enable the observer to do this to his satisfaction.

As a striking proof of the harmony which pervades the works of an All-wise Creator, it may be remarked, that while the Cirrocumulus, and the fair-weather clouds in general, are highly beautiful, the present modification, which presides over the wintry flood, and the ravages of the tempest, exhibits few out of its many forms that can be deemed in any degree shapely; and the blots and ragged patches, in which it sometimes abounds in a stormy season, agree perfectly with the roar of winds, and the aspect of the denuded landscape under a frowning sky. Its extenuated edges, however, preserve it from an absolutely heavy and uncouth appearance; and in spring and autumn, the rising or setting sun confers occasionally upon its waved streaks, in profile near the horizon, a richness of colouring on which the eye may dwell with pleasure.

Whether from a peculiarity of internal constitution, or from its general thinness and continuity, this cloud furnishes, almost exclusively, the skreens in which are represented the circles of the *halo*, with their occasional accompaniments, the parhelion and paraselené.

6. Of the *Cumulostratus*. This may be regarded as the intermediate state between the Cumulus and rain; or rather as that in which the clouds may remain, for many hours together, prepared either to afford showers, or to disperse, according to the course of temperature, electricity and other attendant circumstances. It is accordingly by far the most common cloud in changeable, and even fine weather.

The Cumulus can seldom preserve its original character long, when other vapour, besides that which results from the superficial evaporation, is present in excess. In such a case, acted on probably by extraneous attractions, it either expands spontaneously, as it rises, into a spreading crown, with occasional irregular protuberances, like smoke issuing from a furnace; or it inosculates with the superior modifications, already formed and descending upon it; or, lastly, by lateral increase, amidst Cirrostrati floating in the same region, or loose portions of its own kind, which it can no longer assimilate by its electrical attraction, its nature is changed, and a compound ensues, the various forms of which are comprised in the present modification. Banks and ranges of cloud therefore, of every description, presenting a flattish surface, and bounded by perpendicular or overhanging *cliffs* (for such they often are in real dimension) are referable to the Cumulostratus. Wherever, in short, amidst the light and shade which diversify the magnificent, and often truly mountainous scenery of the sky, that which the artist terms a *recess tint* is discoverable, it may be presumed to result from the combinations peculiar to this modification. The trees and towers, ruins and glaciers, natural bridges, and other varieties of scenery which one may fancy in the clouds, are in general parts of the same arrangement.

A Cumulostratus, well formed and seen single in profile, is quite as beautiful an object as the Cumulus. Its form may be compared in general to that of a *Boletus*, or to a fungus with a very thick stem and protuberant gills: though I have occasionally seen specimens, constructed almost as finely as a Corinthian capital, the summit throwing, like that, a well defined shadow upon the parts beneath.

7. The *Nimbus* is the cloud in which the electricity of the atmosphere is most fully manifested. In the other modifications, it is either gradually accumulating, until it may become strong enough to *superinduce* the earth's surface, or some neighbouring collection of vapours, and thus escape directly or by combination; or it is working its way horizontally through extensive strata, the changes occurring in which visibly betray its movements; but, here, it has already opened itself a passage, and is pouring down, (perhaps also at the same time ascending in a counter

current) in great abundance. I shall not here enlarge on the electrical phenomena of this cloud, which are noted in different parts of my observations.

This modification is evidently not *necessary* to the production of rain, any further than as an excess of electricity may require to be previously disposed of; or in other terms, the equilibrium between the earth's surface and the atmosphere to be restored. Hence it is seen so often, about the commencement and termination of rainy periods. It is scarcely possible for an accurate observer, who has once seen the Nimbus in action, afterwards to confound it with any other appearance. A central portion of dense cloud (in which by the sudden action peculiar to electrical phenomena, the large drops are formed) surmounts a column of falling rain, and is itself crowned with more or less of *cirrosity*, which in some cases extends through a great space upward and all around in straight fibres; and in others exhibits a more compact and fleecy appearance, but without losing the character of the Cirrus. These are the proper constituent parts of this modification; which however is seldom without its appendages. The Cirrostratus flanks it, in the region where the drops are formed, and Cumuli, or portions of the Cumulostratus, are seen successively to enter into this focus, whence they never emerge, but are converted into rain.

From its connexion with local showers, this cloud is distinguished, almost exclusively, by bearing, in its broad field of sable, the honours of the *Rainbow*, that most pleasing, and (were it not of so common occurrence) astonishing exhibition of nature's simple magnificence; which the believer in Divine revelation contemplates with double pleasure, when he reflects, that to it He who formed the world, was pleased, at the close of its great catastrophe, to attach the character of a perpetually recurring sign, that He would no more overwhelm it with the watery element.

Of Rain, Winds, Water-spouts, and Electrical phenomena, connected with Clouds.

The phraseology in general use for these is at present rather confused, and requires its terms to be fixed with greater precision.

1. The term *Nimbus,* for a cloud giving rain, is clearly authorised by the best Latin writers. Then, as to the rain, &c. *Pluvia* (which seems to have been at first the adjective pluvia, used with aqua) may be appropriated to local rain from a definite mass of clouds: whilst Imber, *Imbres,* may denote *the rains,* or a more general and extensive precipitation of water: Tonitrus, tonitrua, *thunder* (as to the sound:) fulgor, *lightning:* fulmen, a *stroke of thunder.* What are called *Fire-balls,* in the accounts commonly given of thunder-storms, I believe are merely the appearance of the body of electric matter, when it moves so slowly that it may be distinctly seen in its passage, which is not commonly the case.

2. *Ecnephias,* (from *ek nephos,* Gr. *proceeding from a cloud)* seems appropriate to the sudden *gusts* which precede and accompany showers and thunder-storms; as well as to the more dangerous occasional winds of the same kind, which our seamen denominate *squalls,* and the French *coups de vent:* though in this language they seem to have a sea-term, *bouillar,* applicable to the wind and rain in connexion. Our seamen also speak of black and white, or *wet* and *dry* squalls: and it is obvious that a cloud, moving swiftly along with a column of rain, snow or hail under it, must

occasion appearances and movements in the air, differing according to the position of the observer, with respect to the shower and its course. Should the term I propose be adopted as a generic one, it may be thus defined; Ecnephias: Ventus fortis, breve et subito ex Nimbo erumpens. Some attendant circumstances might be added, to denote the species; thus, the phenomena described under Tab. 32 would be, Ecnephias, cum magnâ grandine tonitruis et fulgoribus: and we might have Ecnephias *pluvia,* a squall with rain. *sicca,* a dry or white squall, *nivosa, grandinosa,* and possibly other modifications.

3. *Turbo:* a whirlwind. *Tourbillon,* Fr. This term might likewise be made generic, and variously modified by additions in the manner of the last The phenomenon described under Tab. 94, and denominated by the relator a *Tornado,* would then be, Turbo, cum maximâ grandine, tonitruis et fulgoribus.

I suppose the present, as well as the last mentioned case, of a strong wind combined with the highest manifestations of electrical action, to be the result of a peculiarly rapid and abundant condensation of vapour above the clouds: in consequence of which, there is not time afforded for the regular, balanced arrangements of a thunder-cloud: which might give repeated discharges to the earth, and thus relieve the higher atmosphere. On the contrary, there is probably a sudden rushing down of the electric fluid, together with the vapour, through the imperfect conductors which may be present; and which are assisted in their office by a further, almost instantaneous, condensation during the passage. It is obvious, if we consider the nature of electrical attraction, that in this case the course of the fluid may determine that of the air; and make it flow during the discharge, either in a violent narrow stream horizontally, with a counter-current above or beside it; or in two whirlwinds, the one descending from the clouds upon the superinduced surface, the other ascending to restore the equilibrium. And even in the latter case, the horizontal movement of the phenomenon may be accounted for, by its speedily saturating the first spot on which it falls, which then repelling it, the cloud moves to another; and so on, in a line or track of the breadth of the cloud, and extended in length, according to the time taken by the continuous discharge.

4. *Typhon.* Def. Maximus ventorum fortium concursus. *Ouragan*, Fr. A hurricane: what is probably more strictly the application of the term *tornado*; when the wind, having blown with extraordinary violence from one quarter for a while, shifts to another, and so on, till its violence abates. See Tab. 84, and II. 29. This genus, again, may be made to comprehend different modifications, by short descriptive epithets. Hurricanes are almost always attended, I believe, with electrical manifestations, and occasionally with a great variety of them. In an account which I possess in manuscript (I know not whence extracted) of the tremendous one in the West Indies, in 1772, the writer says, "I must still mention how dreadful every thing looked in this, in itself, horrible and dark night; there being so many fiery meteors in the air, which I and others who were in the same situation were spectators of. Towards the East, the face of the heavens presented to our view a number of *fiery rods* (electrical brushes?) which were through the whole night shooting and darting in all directions; likewise *fiery balls* (bolides?) which flew up and down, here and there, and burst into a number of small pieces, and flew to and fro like torches of straw,

and came very near where we lay in the road. This was the state of the air over the town: in other parts, *another sort* of fiery balls flew through the air with great rapidity; and notwithstanding all these phenomena, common *thunder* and *lightning* was abundantly great." This account is dated, West end of Santa Cruz (Antigua) and signed, M. Smith. I have no reason to doubt its authenticity.

5. *Trombus.* The Waterspout. *Trombe*, Fr.

Were it proved that this phemomenon is the mere result of a Whirlwind, it might be denominated Turbo aquosus: but I think the accounts we have of spouts clearly prove them to be, in general, of electrical origin. I suppose the surface of the sea to be superinduced by a great mass of cloud, or condensing vapour, above; yet under such circumstances, that the necessary apparatus for regular successive discharges cannot be formed. The surface, then, rises in large papillæ, and froths up to meet the cloud, while the latter is propagated downwards in a lessening cone, to meet the water—and, the passage being thus opened, a portion of the sea water suddenly rushes up to be dispersed in the cloud, while a copious condensation of the water of the latter is carried in a stream into the sea: the rapidity of the movement, and the resistance of the air, causing one or both streams to assume a whirling motion, in order to effect their passage. The inosculation of a dense Cumulus with a sheet of Cirrostratus above it, which is a common phenomenon, often ending like the Waterspout in rain, may illustrate these more remarkable effects of a stronger charge, existing in a cloud suspended over the sea: and I should define the Trombus thus, Mutua inter aquas ad maris superficiem, et in nube proximâ, viribus electricis motas, penetratio. If there be in nature a phenomenon, which might be fairly brought in argument, in favour of the existence of *two fluids* in electricity, it is, I think, this of the Waterspout. It is not always, however, the complete electrical operation here described; and as a thunderstorm is on different occasions a different process, with certain common appearances attending it, so the case may be in this instance.

Of some luminous phenomena connected with Clouds.

1. *Anthelion.* Imago solis, a nube oppositâ, quasi ab aquæ superficie, reflexa.

This is, in effect, the whole history of the Anthelion, that, when the surface of a dense cloud presents properly for the effect, there is the same tendency to reflect the Sun's image, as in a surface of water. Since I first distinctly recognised the phenomenon, I have often been able to trace it, in a greater or less degree of perfection, on the perpendicular sides, or in the recesses between the crown and the foot, of a large Cumulostratus; the cloud being opposite to the Sun at a moderate elevation, and the sky overhead clear. Here we may discover, at intervals, a broad spot of light, much brighter than the rest of the cloud, and proceeding now and then to a momentary circular image, which is presently lost again by the increase, or change of direction, of that part of the surface. This, I have no doubt, is the same kind of reflexion which, under favourable circumstances, has occasionally produced the Sun's image, amidst surrounding clouds in shade, in such brightness as to fix the attention of even a casual observer. See p. 11.

2. *Parhelion.* Solis species falsa, diversos inter halones in nebulâ effulgens. Plerumque duo vel plures, unà cum ipso Sole emicant.

Having had few opportunities of seeing *parhelia,* I can only state, that the phenomenon appears to be seated in the points of intersection of different halos, and to derive its brightness from the union of their different reflexions in those parts. A mist near the earth, of very moderate density, surmounted by several Cirrostrati differently inclined to the horizon, may furnish the medium for a perfect exhibition of parhelion: and a frozen state of the particles composing these clouds, is perhaps accessary to the effect. It is a phenomenon which our best observers do not know when to look out for: otherwise we should probably have had a more satisfactory account of its nature and mode of production.

3. *Paraselené.* Lunæ species falsa, inter diversos halones in nebulâ visa.

I have never seen the *paraselené,* but have ventured to make its definition accord with that of parhelion; to which the same remarks are probably applicable. See p. 19.

4. *Corona.* Area lucida, sphæram referens, quæ in nube vel nebulâ circa Lunam nocte videtur.

The Corona is so common an appearance, when thin stratified clouds are carried over by night, the Moon shining, that I have seldom thought it needful to make a note of it. A circular space full of a mild whitish light surrounds the Moon's disk; and by the passing of the light to some degree of colour (yellow or brownish) at the outer part, its appearance may be compared to a spherical lantern, with the luminary in the midst of it. The phenomenon however varies much, and is only occasionally splendid or conspicuous.

5. *Halo.* Area lucida, inter duo vel plures circulos inclusa, plerumque colores iridis referens, quæ circa Solem aut Lunam in nube vel nebulâ videtur.

The Halo is less common than the Corona, and the Solar much less frequent than the Lunar halo. It is a broad circle of variable diameter, sometimes white, but more often exhibiting the prismatic colours; which appears in a thin cloud (or in a low diffused haze by the help of the cloud's reflexion), around the Sun's or Moon's disk. Sometimes more than one circle or series of colours appears at once, and at very different distances from the luminary in the centre.

Coronas and halos, from their connexion with the modification *Cirrostratus*, in which they chiefly appear, are found to indicate wind and rain; sometimes at the approach of winter, snow and frost; when they are high coloured; and again, late in the spring, I have repeatedly observed a large white Lunar halo to be followed merely by hot weather.

6. *Iridula.* Area circularis in qua colores iridis emicant, guttulis roris, super gramina vel aranea compestria, sparsis reflexae.

I have ventured to form this diminutive of the rainbow, in order to apply it as a generic term to those little representations of the bow, which are commonly met with in autumn, formed by the dew-drops on the grass, the gossamer, &c.

7. *Iris.*

This term may be made to comprehend at least three modifications.

1. Iris *Arcus pluvius*: the Rainbow: of which the more rare kind, exhibited in a shower by the light of the Moon, may be distinguished by the addition of the epithet *nocté* or *nocturnus*. See Tab. 26. II. 35, 68.

It is unnecessary to define this very common phenomenon. I may just remark here, that an opinion lately advanced by Dr. Watt in Thomson's Annals, that the refraction of the rays takes place, not in the raining cloud, but on the edge of another, situate between it and the Sun, appears to me to be altogether unfounded.

2. Iris *Arcus nebulæ*: the white or colourless bow, seen in a mist without rain. See Tab. 30, 75.

3. Iris *Gloria. Def.* Umbrâ spectatoris in nubem projectâ, circulos, colores iridis referentes, quasi circum caput suum pictos, in nube videt. *A glory.*

This curious phenomenon is well described, and figured, in a paper by Dr. Haygarth, in the Manchester Society's Memoirs, vol. iii. p. 463; as he observed it in the year 1780, in the vale of Clwyd. I should not, however, have thought of introducing this definition, had it not fallen to my lot to see it myself this summer.

On the 29th of the Seventh month, 1820, at Folkstone, Kent, the day was fine, with the Barometer at 30 inches, and the wind Easterly. There was a mist, of the kind which I commonly refer to the *Cirrostratus,* resting the whole forenoon on the cliffs towards Dover, and on the high land North of the town. Towards evening, the mist subsided from the cliffs, and appeared on the sea below them; a body of cloud, which appeared to be *Cumulostratus,* shewing itself also close to the horizon, on the high land abovementioned.

About half past six, p.m. walking with my family towards Sandgate, West of the town, we perceived that the mist on the sea was advancing and spreading itself Westward, and towards the shore; and a body of it came at length close under the sandy cliff, on which we stood, at the height of about 140 feet from the sea. This mist was of various depths: a brig near the shore was at intervals completely hidden by it, up to her topmasts: it exhibited a mixture of *Cumulus* and *Cirrostratus*. In this state of things, the Sun shining clear above the Western horizon, our shadows were projected, together with that of the cliff's edge, upon the cloud beneath, on the surface of which, at the same time, each person could perceive, around the upper part of one of the shadows (which being distant were small, and rather indistinct) a luminous *corona*, surrounded by two faintly coloured *halos*. The outer halo was very large, compared with our shadows: it surrounded the whole group, and a considerable part of the circle was cut off by the shadow of the cliff. Consequently, when one of the party removed to a distance, his shadow was seen to pass the circle and appear by itself, without the *glory*; notwithstanding which *he* continued to perceive the whole of the phenomenon for himself, around his own shadow; those of the rest appearing to him at a distance, and also without it. We were able to continue these observations for about twenty minutes; until, the Sun approaching the horizon, the shadows became too distant to be perceived, and the circles vanished. A thunderstorm followed these appearances, in the night of the 30th, after which we had again fine weather. The whole phenomenon was highly curious and interesting; and the facility with which each of the party could either appropriate the *glory* to himself or share it with the company present, suggested to me some reflexions of a *moral* nature—in which, however, I shall not anticipate the reader.

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MONTHLY AMOUNTS of R Guag

Rate of addition for the ground.	} 0·50	0·45	0·40	0
Year	1. Jan.	2. Feb.	3. Mar.	pt.
1797	1·440 in.	0·317 in.	1·087 in.	3 in.
1798	1·657	1·004	0·466	4
1799	1·423	3·240	0·606	8
1800	3.687	0·377	0·427	0
1801	1·839	0·788	1·551	6
1802	0·219	2·175	0·555	6
1803	2·316	1·078	0·628	2
1804	2·509	1·938	2·154	0
1805,	2·269	1·515	1·234	0
1806	2·755	0·775	1·859	4
1807	0·720	1·370	0·860	0
1808	1·620	0·980	0·290	0
1809	5·740	1·560	0·570	0
1810	0·165	1·260	2·520	0

N. B. Th n Tab

TABLE OF LUNATIONS.

FOR THE WHOLE SPACE OCCUPIED BY THE REGISTER.

Compiled from WHITE'S EPHEMERIS.

—The minutes are always in *addition* to the hour; the mark (a) denotes that the *time expressed* is between midnight and noon, and (p) that it is between noon and midnight.

	New Moon				First Quarter				Full Moon				Last Quarter			
		day	h.	m.		day	h.	m.		day	h.	m.		day	h.	m.
	Nov.	10	11	41 a.		18	7	20 a.		26	2	1 a.	Dec.	2	10	44 p.
	Dec.	10	2	24 a.		18	4	31 a.		25	3	p				
													Jan.	1	6	57 a.
	Jan.	8	7	36 p.		16	12	26 a.		24	2	31 a		30	5	18 p.
	Feb.	7	2	15 p.		15	5	35 p.		22	12	47 p.	Mar.	1	6	21 a.
	March	9	8	52 a.		17	7	5 a.		23	10	9 p.		30	9	45 p.
	April	8	2	7 a.		15	4	38 p.		22	7	15 a.	Apr.	29	2	39 p.
	May	7	5	6 p.		14	10	59 p.		21	4	42 p	May	29	8	3 a.
	June	6	5	24 a.		13	3	30 a.		20	3	10 a.	June	28	1	15 a.
	July	5	3	15 p.		12	7	53 a.		19	3	11 p.	July	27	5	46 p.
	Aug.	3	11	27 p.		10	1	52 p.		18	5	10 a.	Aug.	26	9	4 a.
	Sept.	2	7	5 a.		8	10	46 p.		16	9	6 p.	Sept.	24	10	34 p.
	Oct.	1	3	13 p.		8	11	21 a.		16	2	30 p.	Oct.	24	9	56 a.
		31	12	42 a.	Nov.	7	3	45 a.		15	8	14 a	Nov.	22	7	16 p.
	Nov.	29	11	58 a.	Dec.	6	11	21 p.		15	12	55 a.	Dec.	22	3	17 a.
	Dec.	29	1	9 a.												
08					Jan.	5	8	54 p.		13	3	31 p.		20	11	6 a.
	Jan.	27	4	9 p.	Feb.	4	6	31 p.		12	3	53 a.		18	7	47 p.
	Feb.	26	8	43 a.	March	5	1	55 p.		12	2	21 p.		19	5	53 a.
	Mar.	27	2	11 a.	April	4	5	28 a.		10	11	26 p.		17	5	36 p.
	Apr.	25	7	28 p.	May	3	4	42 p.		10	7	39 a.		17	7	2 a.
	May	25	11	19 a.	June	1	12	23 a.		8	3	34 p		16	10	8 p.
	June	24	12	56 a.	July	1	5	45 a.		7	12	3 a.		15	2	53 p.
	July	23	12	18 p.		30	10	21 a.	Aug.	6	10	5 a.		14	8	41 a.
	Aug.	21	10	10 p.	Aug.	28	3	40 p.	Sept.	4	10	41 p.		13	2	30 a.
	Sept.	20	7	27 a.	Sept.	26	10	56 p.	Oct.	4	2	18 p.		12	7	6 p.
	Oct.	19	4	54 p.	Oct.	26	9	10 a.	Nov.	3	8	27 a.		11	9	41 a.
	Nov.	18	2	55 a.	Nov.	24	11	3 p.	Dec.	3	3	35 a.		10	9	52 p.
	Dec.	17	1	36 p.	Dec.	24	4	43 p.								
809									Jan.	1	9	53 p.		9	7	51 a.
	Jan.	16	1	9 a.		23	1	23 p.		31	2	8 p	Feb.	7	4	13 p.
	Feb.	14	1	59 p.		22	11	2 a.	Mar.	2	3	57 a.	Mar.	8	11	43 p.
	Mar.	16	4	19 a.		24	7	18 a.		31	3	23 p.	April	7	7	9 a.
	Apr.	14	7	57 p.		22	12	27 a.	Apr.	30	12	41 a.	May	6	3	26 p.
	May	14	12	4 p.		22	1	55 p.	May	29	8	18 a.	June	5	1	30 a.
	June	13	3	42 a.		20	11	58 p.	June	27	3	7 p.	July	4	2	2 p.
	July	12	6	13 p.		20	7	25 a.	July	26	10	14 p	Aug.	3	5	21 a.
	Aug.	11	7	33 a.		18	1	20 p.	Aug.	25	7	3 a.	Sept.	1	11	4 p.
	Sept.	9	7	58 p.		16	6	51 p.	Sept.	23	6	38 p	Oct.	1	6	10 p.
	Oct.	9	7	42 a.		16	1	12 a.	Oct.	23	9	25 a		31	1	22 p.
	Nov.	7	6	49 p.		14	9	40 a.	Nov.	22	2	57 a.	Nov.	30	7	18 a
	Dec.	7	5	21 a.		13	9	17 p.	Dec.	21	10	p.	Dec.	29	10	47 p.

TABLE OF LUNATIONS.

Year	New Moon				First Quarter				Full Moon				Last Quarter			
		day	h.	m.		day	h.	m.		day	h.	m.		day	h.	m.
1810	Jan.	5	3	37 p.		12	12	32 p.		20	5	6 p.		28	11	14 a.
	Feb.	4	2	8 a.		11	6	53 a.		19	10	58 a.		26	8	37 p.
	Mar.	5	1	23 p.		13	2	47 a.		21	2	31 a.		28	3	39 a.
	Apr.	4	1	37 a.		11	10	32 p.		19	3	8 p.		26	9	28 a.
	May	3	2	46 p.		11	4	41 p.		19	1	10 a.		25	3	25 p.
	June	2	4	38 a.		10	8	20 a.		17	8	18 a.		23	10	47 p.
	July	1	7	6 p.		9	9	9 p.		16	2	50 p.		23	8	41 a.
		31	10	10 a.	Aug.	8	7	20 a.		14	9	46 p.		21	9	41 a.
	Aug.	30	1	35 a.	Sept.	6	3	24 p.		13	6	17 a.		20	2	[illegible]
	Sept.	28	4	46 p.	Oct.	5	10	14 p.		12	5	6 p.		20	9	17 a.
	Oct.	28	6	58 a.	Nov.	4	4	57 a.		11	6	29 a.		19	6	[illegible]
	Nov.	26	7	44 p.	Dec.	3	12	43 p.		10	10	20 p.		19	2	47 a.
	Dec.	26	7	9 a.												
1811					Jan.	1	10	30 p.		9	4	16 p.		17	9	11 p.
	Jan.	24	5	45 p.		31	10	56 a.	Feb.	8	11	27 a.		16	12	3 p.
	Feb.	23	4	3 a.	Mar.	2	1	56 a.	Mar.	10	6	18 a.		17	11	3 p.
	Mar.	24	2	12 p.		31	6	56 p.	Apr.	8	11	3 p.		16	6	48 a.
	Apr.	22	12	19 a.	Apr.	30	1	3 p.	May	8	12	39 p.		15	12	26 p.
	May	22	10	42 a.	May	30	7	12 a.	June	6	11	7 p.		13	5	16 a.
	June	20	10	2 p.	June	28	12	18 a.	July	6	7	26 a.		12	10	45 p.
	July	20	11	4 a.	July	28	3	34 p.	Aug.	4	2	53 p.		11	6	[illegible]
	Aug.	19	2	12 a.	Aug.	27	4	42 a.	Sept.	2	10	35 p.		9	4	30 p.
	Sept.	17	6	57 p.	Sept.	25	3	48 p.	Oct.	2	7	16 a.		9	7	1 a.
	Oct.	17	12	9 p.	Oct.	25	1	16 a.		31	5	19 p.	Nov.	8	1	16 a.
	Nov.	16	4	28 a.	Nov.	23	9	36 a.	Nov.	30	7	9 a.	Dec.	7	10	24 p.
	Dec.	15	7	11 p.	Dec	22	5	30 p.	Dec.	29	7	11 p.				
1812													Jan.	6	8	19 a.
	Jan.	14	8	18 a.		21	1	49 a.		28	11	38 a.	Feb.	5	4	40 p.
	Feb.	12	8	p.		19	11	27 a.		27	5	51 a.	Mar.	6	9	49 a.
	Mar.	13	6	22 a.		19	11	p.		27	12	16 a.	April	4	11	[illegible]
	Apr.	11	3	27 p.		18	12	41 p.		26	5	10 p.	May	4	8	37 a.
	May	10	11	39 p.		18	4	16 a.		26	7	34 a.	June	2	3	10 p.
	June	9	7	50 a.		16	9	7 p.		24	7	33 p.	July	1	7	53 p.
	July	8	5	13 p.		16	2	25 p.		24	5	45 a.		30	12	18 a.
	Aug.	7	4	55 a.		15	7	28 a.		22	2	59 p.	Aug.	29	6	1 a.
	Sept.	5	7	22 p.		13	11	39 p.		20	11	51 p.	Sept.	27	2	[illegible]
	Oct.	5	12	10 p.		13	2	25 p.		20	8	51 a.	Oct.	27	2	35 a.
	Nov.	4	6	14 a.		12	3	15 a.		18	6	30 p.	Nov.	25	7	30 p.
	Dec.	3	12	20 a.		11	1	51 p.		18	5	23 a.	Dec.	25	3	1 p.
1813																
	Jan.	2	5	21 p.		9	10	27 p.		16	6	4 p		24	12	31 p.
	Feb.	1	8	36 a.		8	6	2 a.		15	8	43 a.		22	9	44 a.
	Mar.	2	9	30 p.		9	1	43 p.		17	12	48 a.		25	4	45 a.
	Apr.	1	7	55 a.		7	10	28 p.		15	5	20 p		23	8	25 p.
		30	4	14 p.	May	7	8	54 a.		15	9	26 a.		23	8	5 a.
	May	29	11	21 p.	June	5	9	17 p.		14	12	32 a.		21	4	15 p.
	June	28	6	26 a.	July	5	11	40 a.		13	2	24 p.		20	9	57 p.
	July	27	2	43 p.	Aug.	4	4	1 a.		12	2	57 a.		19	2	43 a.
	Aug.	26	1	8 a.	Sept.	2	10	p.		10	2	13 p.		17	6	8 a.

TABLE OF LUNATIONS.

	New Moon			First Quarter			Full Moon			Last Quarte.		
Year	day	h.	m.	day	h.	m.	day	h.	m.	day	h.	m.
1813	Sept. 24	2	11 p.	Oct. 2	4	46 p.	10	12	31 a.	16	3	34 p.
	Oct. 24	5	56 a.	Nov. 1	10	58 a.	8	10	23 a.	15	2	1 a.
	Nov. 22	11	58 p.	Dec. 1	3	3 a.	7	8	25 p.	14	3	53 p.
	Dec. 22	7	15 p.	30	4	10 p.						
1814							Jan. 6	7	8 a.	13	9	3 a.
	Jan. 21	2	13 p.	29	2	22 a.	Feb. 4	6	46 p.	12	4	45 a.
	Feb. 20	7	11 a.	27	10	26 a.	Mar. 6	7	15 a.	14	1	30 a.
	Mar. 21	9	6 p.	28	5	21 p.	April 4	8	29 p.	12	9	23 p.
	Apr. 20	7	55 a.	26	12	6 a.	May 4	10	29 a.	12	2	41 p.
	May 19	4	23 p.	26	7	31 a.	June 3	1	15 a.	11	4	27 a.
	June 17	11	32 p.	24	4	33 p.	July 2	4	34 p.	10	2	54 p.
	July 17	6	26 a.	24	4	3 a.	Aug. 1	7	51 a.	8	10	54 p.
	Aug. 15	2	5 p.	22	6	46 p.	30	10	26 p.	Sept. 7	5	34 a.
	Sept. 13	11	18 p.	21	12	41 p.	Sept. 29	11	53 a.	Oct. 6	11	58 a.
	Oct. 13	10	51 a.	21	8	49 a.	Oct. 28	12	16 a.	Nov. 4	7	4 p.
	Nov. 12	1	15 a.	20	5	16 a.	Nov. 27	11	52 a.	Dec. 4	3	45 a.
	Dec. 11	6	36 p.	19	12	5 a.	Dec. 26	11	p.			
1815										Jan. 2	2	52 p.
	Jan. 10	1	57 p.	18	4	2 p.	25	9	47 a.	Feb. 1	5	2 a.
	Feb. 9	9	31 a.	17	4	44 a.	23	8	16 p.	Mar. 2	10	8 p.
	Mar. 11	3	21 a.	18	2	19 p.	25	6	37 a.	April 1	5	7 p.
	Apr. 9	6	20 p.	16	9	21 p.	23	5	17 p.	May 1	12	17 p.
	May 9	6	20 a.	16	2	47 a.	23	4	57 a.	31	6	4 a.
	June 7	3	53 p	14	7	53 a.	21	6	p.	June 29	9	41 p.
	July 6	11	47 p.	13	2	12 p.	21	8	33 a.	July 29	11	2 a.
	Aug. 5	6	57 a.	11	11	13 p.	19	12	11 a.	Aug. 27	10	22 p.
	Sept. 3	2	21 p.	10	12	noon	18	4	14 p.	Sept. 26	7	57 a.
	Oct. 2	10	55 p.	10	4	44 a.	18	8	3 a	Oct. 25	4	8 p.
	Nov. 1	9	34 a.	9	12	34 a.	16	11	8 p.	Nov. 23	11	32 p.
	30	10	51 p.	Dec. 8	9	50 p.	16	12	58 p.	Dec. 23	7	9 a.
	Dec. 30	2	51 p.									
1816				Jan. 7	6	41 p.	14	1	18 a.	21	4	13 p.
	Jan. 29	8	50 a.	Feb. 6	1	29 p.	13	12	9 p.	20	3	42 a.
	Feb. 28	3	31 a.	Mar. 7	4	55 a.	13	9	47 p.	20	5	41 p.
	Mar. 28	9	27 p.	April 5	4	22 p.	12	6	43 a.	19	9	38 a.
	Apr. 27	1	31 p.	May 4	12	8 a.	11	3	40 p.	19	2	35 a.
	May 27	3	7 a.	June 3	5	18 a.	10	1	19 a.	17	7	48 p.
	June 25	2	7 p.	July 3	9	28 a.	9	12	21 p.	17	12	46 p.
	July 24	11	9 p.	31	2	25 p.	Aug. 8	1	18 a.	16	4	58 a.
	Aug. 23	7	6 a.	Aug. 29	9	43 p.	Sept. 6	4	22 p.	14	7	47 p.
	Sept. 21	3	3 p.	Sept. 28	8	25 a.	Oct. 6	9	19 a.	14	8	35 a.
	Oct. 20	11	56 p.	Oct. 27	10	58 p.	Nov. 5	3	18 a.	12	7	8 p.
	Nov. 19	10	23 a.	Nov. 26	5	6 p.	Dec. 4	8	51 p.	12	3	52 a.
	Dec. 18	10	37 p.	Dec. 26	1	52 p.						
1817							Jan. 3	12	44 p.	10	11	42 a.
	Jan. 17	12	38 p.	25	11	43 a.	Feb. 2	2	15 a.	8	7	46 p.
	Feb. 16	4	19 a.	24	8	27 a.	Mar. 3	1	35 p.	10	4	53 a.
	Mar. 17	9	11 p.	26	2	2 a.	Apr. 1	11	9 p.	8	3	28 p.
	Apr. 16	2	28 p.	24	3	23 p.	May 1	7	33 a.	8	3	39 a.

TABLE OF LUNATIONS.

	New Moon			First Quarter			Full Moon			Last Quarter		
Year	day	h.	m.	day	h.	m.	day	h.	m.	day	h.	m.
1817	May 16	7	a.	24	12	42 a.	30	3	21 p.	June 6	5	57
	June 14	9	45 p.	22	7	4 a.	June 28	11	18 p.	July 6	9	25
	July 14	10	17 a.	21	11	56 a.	July 28	8	22 a.	Aug. 5	2	51
	Aug. 12	9	p.	19	4	50 p.	Aug. 26	7	36 p.	Sept. 3	9	[illegible]
	Sept. 11	6	43 a.	17	11	3 p	Sept. 25	9	47 a.	Oct. 3	2	42
	Oct. 10	4	15 p.	17	7	44 a	Oct. 25	2	55 a.	Nov. 2	6	43
	Nov. 9	2	8 a.	15	7	44 p.	Nov. 23	9	56 p.	Dec. 1	8	21
	Dec. 8	12	33 p.	15	11	29 a	Dec. 23	4	59 p.	31	7	33
1818	Jan. 6	11	36 p.	14	6	44 a.	22	10	26 a.	29	4	42
	Feb. 5	11	38 a.	13	4	2 a.	21	1	29 a.	27	12	27
	March 7	12	59 a.	15	1	8 a.	22	2	1 p.	29	7	57
	April 5	3	44 p.	13	7	51 p.	20	12	13 a.	27	3	4
	May 5	7	26 a.	13	11	8 a	20	8	29 a.	26	11	49
	June 3	11	13 p.	11	10	51 p	18	3	28 p.	25	10	46
	July 3	2	18 p.	11	7	37 a.	17	10	14 p.	25	12	33
	Aug. 2	4	22 a.	9	2	23 p	16	6	5 a.	23	5	12
	31	5	28 p.	Sept. 7	8	9 p	14	4	14 p.	22	11	56
	Sept. 30	5	48 a.	Oct. 7	2	5 a	14	5	29 a.	22	7	30
	Oct. 29	5	28 p.	Nov. 5	9	24 a	12	9	49 p.	21	2	29
	Nov. 28	4	27 a.	Dec. 4	7	19 p	12	4	19 p.	20	7	32
	Dec. 27	2	52 p.									
1819				Jan. 3	8	40 a.	11	11	36 a.	19	9	43
	Jan. 26	1	10 a.	Feb. 2	1	24 a	10	6	15 a.	17	8	39
	Feb. 24	11	53 a.	Mar. 3	8	31 p	11	11	2 p.	19	4	41
	Mar. 25	11	24 p.	April 2	4	19 p	10	1	5 p.	17	10	47
	Apr. 24	11	48 a.	May 2	11	13 a	9	12	6 a	16	4	17
	May 24	1	2 a.	June 1	4	7 a.	8	8	30 a.	14	10	34
	June 22	3	1 p.	30	6	28 p.						

Note.—A scheme of the weather has been for some years in circulati under the title of *Herschel's Table* (disclaimed however by the celebrat Astronomer of that name) in which the changes are made to depend, in gre measure, on the hour of day or night, at which the Moon enters upon several phases—*noon* being the point most likely to be followed by rain, an *midnight* most favourable to fair weather: the meridian for which it is calculat not expressed. This scheme appears to me to be empirical, and its merits co sequently very dubious—but the reader who may possess and incline to examin it, as to London, may do this by comparing the times of the Lunations, as her stated, with the *Rain column* and Notes in my Tables; referring to the scheme as he proceeds.

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